

GCET20

20th Global Conference on Environmental Taxation
25-28 September 2019, Limassol, Cyprus

25-28 September 2019
Limassol – Cyprus

20TH GLOBAL CONFERENCE ON ENVIRONMENTAL TAXATION **“Economic Policies for Low-Carbon Development”**

www.gcet20.com

**P
R
O
G
R
A
M
M
E**

Organizer



Cyprus
University of
Technology

20th Global Conference on Environmental Taxation

Economic Policies for Low-Carbon Development

25-28 September 2019, Limassol, Cyprus

Conference Programme



Conference Programme, 20th Global Conference on Environmental Taxation

© 2019, Cyprus University of Technology

Cover design: Top Kinisis Travel Public Ltd.

Printed on 100% recycled paper

Printed in Cyprus by Theopress Ltd, 1 M. Kousoulide Street, CY – 1027, Nicosia

CONTENTS

Welcome Message	4
General Information	5
About GCET	5
About the Cyprus University of Technology.....	6
Conference Venue – GrandResort Hotel	6
Social Programme.....	7
Registration and Other Information.....	9
Instructions for Presenters of Papers.....	9
Conference Sponsors and Supporters	10
Conference Programme Overview	11
Keynote Speakers	12
Plenary Panel Discussions.....	14
Larry Kreiser Award.....	21
Overview of Parallel Sessions	22
Detailed Programme of Parallel Sessions.....	23
Abstracts	29
International Programme Committee	104
Local Scientific Committee	104
Critical Issues in Environmental Taxation Publication.....	105
Index of Participants.....	106

Welcome Message

It is a great honour and pleasure to welcome you to Cyprus for the 20th Global Conference on Environmental Taxation.

GCET is the leading global forum for exchanges on the principles and practices of environmental taxation and other market-based instruments for greening the economy and promoting the transition to low-carbon and resource-efficient societies. Research presented at the previous nineteen conferences has helped provide a much stronger theoretical and empirical underpinning of the legal, economic and behavioural issues in this area. As with previous GCET conferences, a selection of contributions of GCET20 will be published in the prestigious book series “Critical Issues in Environmental Taxation” from Edward Elgar publishers.

The main theme of GCET20 is “**Economic Policies for Low-Carbon Development**”. The role of economic policy instruments for the transition to a low-carbon economy is widely recognised. Several instruments of this kind have been adopted around the world and can contribute to shifting private investment decisions and consumer behaviour towards cleaner and more resource-efficient production and consumption patterns. Today, more jurisdictions in the world than ever before are applying carbon pricing policies, although – in most cases – at levels that are clearly lower than those needed to achieve the climate stabilisation targets foreseen in the Paris agreement on climate change.

In order to enhance the effectiveness of these instruments and increase their political acceptance, a consistent effort is required in order to align policies in other domains with low-carbon development priorities. Reforms in sectors such as finance, trade, land use, mobility and innovation are needed for this purpose. Presentations and discussions at GCET20 will shed light on several of these issues. We thus hope to achieve a high level of interaction between participants during the plenary and parallel sessions of the Conference

The conference is organised by the Cyprus University of Technology, located in Limassol, the major coastal town of Cyprus, and is held under the auspices of the Finance Minister of Cyprus Mr. Harris Georgiades, who is scheduled to deliver a welcome address during the GCET20 opening ceremony.

I am looking forward to exciting discussions!



Associate Professor Theodoros Zachariadis
GCET20 Conference Chair
Dean, Faculty of Geotechnical Sciences and Environmental Management
Cyprus University of Technology

General Information

About GCET

The global conference on environmental Taxation (GCET) has been held every year since 2000 as an international meeting of specialists and a forum for the exchange of ideas and research findings on environmental taxation and other market based instruments designed to protect the environment and foster sustainability.

The annual conferences provide an international and interdisciplinary setting to explore issues concerning the design and implementation of environmental taxes and opportunities for creating networks to expand and explore various theoretical and practical issues. The conferences are not intended to advance any particular environmental agenda but seek to advance knowledge and foster understanding and debate. The GCET has brought experts from more than 50 countries together, representing a wide range of disciplines (law, economics, finance, environmental science etc.), sectors (academic, government and non-governmental institutions and the private sector) and international organizations (UN, OECD and EU). The main emphasis of GCET is to provide insights and analysis on how enlightened tax policy can promote sustainable environmental goals.

Here is an overview of previous conferences:

<i>Year</i>		<i>Location</i>	<i>Organizing Host</i>
2000	GCET 1	Cleveland Ohio, USA	Cleveland State University
2001	GCET 2	Vancouver, Canada	Cleveland State University and Pembina
2002	GCET 3	Woodstock, Vermont, USA	Vermont Law School
2003	GCET 4	Sydney, Australia	Macquarie University
2004	GCET 5	Pavia, Italy	University of Pavia
2004	GCET 6	Leuven, Belgium	Leuven University
2005	GCET 7	Ottawa, Canada	University of Ottawa
2007	GCET 8	Munich, Germany	Green Budget Germany
2008	GCET 9	Singapore	National University of Singapore
2009	GCET 10	Lisbon, Portugal	Institute for International Strategic Studies
2010	GCET 11	Bangkok, Thailand	Maharakham University
2011	GCET 12	Madrid, Spain	Complutense University of Madrid
2012	GCET 13	Vancouver Canada	University of British Columbia
2013	GCET 14	Kyoto, Japan	Kyoto University and Meijo University
2014	GCET 15	Copenhagen, Denmark	Aarhus University
2015	GCET 16	Sydney, Australia	University of Technology Sydney
2016	GCET 17	Groningen, Netherlands	Groningen University
2017	GCET 18	Tucson, Arizona, USA	James E. Rogers College of Law, University of Arizona
2018	GCET 19	Madrid, Spain	CEU San Pablo University

➤ *Anyone interested in organizing and hosting a future GCET, please feel free to contact Janet Milne, Mikael Skou Andersen or Hope Ashiabor.*

About the Cyprus University of Technology

The Cyprus University of Technology (CUT) is a newly established public university, which was founded by law in December 2003. It is one of the three state universities operating in the Republic of Cyprus. CUT has six Faculties and eleven academic Departments, able to offer education and high level research in primary fields of science and technology, at undergraduate and postgraduate levels. Currently it educates about 3,000 students and includes an academic and administrative staff of about 700 people.

Although it initiated its research activity very recently, CUT already participates in a significant number of research projects funded by national authorities and European programmes such as Research Framework Programmes FP7 and Horizon2020 (including one prestigious grant from the European Research Council); the LIFE Programme; European Territorial Cooperation Programmes such as Interreg IIIB, Archimed, Interreg IVC, MED etc. The University has adopted research principles which conform to the European Union's declarations on the creation of the European Research Area (ERA).

Despite its short history, the University has already been ranked 301-350th in the Times Higher Education World University Rankings in 2018-2019. Moreover, it has been ranked in the highly honourable 2nd place among the top 50 universities in New Europe, i.e. the 13 countries who have joined the European Union since 2004. This highlights the University's devotion to quality research and teaching, and motivates its staff for higher international achievements.

The University's Faculties are:

- The Faculty of Geotechnical Sciences and Environmental Management
- The Faculty of Management and Economics
- The Faculty of Engineering and Technology
- The Faculty of Health Sciences
- The Faculty of Fine and Applied Arts
- The Faculty of Communication and Media Studies

More information can be found at the University's website: www.cut.ac.cy.

Conference Venue – GrandResort Hotel

The GrandResort (Amathountos 127, CY - 4533 Parekkklisia – grandresort.com.cy) is among the finest five star hotels in Cyprus set in beautifully landscaped tropical gardens, on a beautiful beach side location in the Amathus area of Limassol. It is located 11 kilometres from Limassol town centre and offers a large range of facilities. The hotel offers superior accommodation with quality amenities and first class service.

All conference rooms to be used at GCET20 are located on the ground floor, very close to the hotel lobby.

Social Programme

Wednesday 25 September 2019, 18:30-20:30



Welcome reception at the Cyprus University of Technology, Athinon Street, Limassol – <https://goo.gl/maps/rKQkv75bCHhPk4jH7>.

With welcome addresses by the University Rector Professor Andreas Anayiotos and the Mayor of Limassol Mr. Nicos Nicolaides.

Buses to depart from the conference venue (Grand Resort Hotel) to the University at 18:00. They will depart from the University to the conference venue at 20:30.

Thursday 26 September 2019, 19:00-22:30



Conference dinner in the village of Lofou, northwest of Limassol, at the courtyard of the old school of the village.

Buses to depart from the conference venue (Grand Resort Hotel) at 18:00. They will depart from the village to the conference venue after 22:00.

Saturday 28 September 2019, 09:30-15:30



Optional excursion and guided tour to the archaeological site of Kourion and the village of Omodos (including lunch).

Only for those who have already registered for the tour. Buses to depart from the conference venue (Grand Resort Hotel) at 09:30 and return at approximately 15:30, depending on traffic conditions.



Registration and other information

The registration desk will be open at the conference venue (Grand Resort Hotel) on Wednesday 25 September 16:00-18:00, Thursday 26 September 8:00 – 18:00 and Friday 27 September 8:00 – 18:00.

Free WIFI will be available for all participants in the whole venue.

Twitter hashtag: #GCET20

Instructions for Presenters of Papers

If you are a parallel session presenter or moderator, please read the relevant information below regarding technology, timing, and the timekeeper role:

Presentation Technology

A computer and projector will be available in each room for presentations. Please use PowerPoint (ppt, pptx) 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.

Presenters

Presenters are invited to come to the room at least 10 minutes prior to the start of the session to upload their presentation and check functionality – all parallel sessions have a break immediately preceding them so there will be time available for such a check. We recommend using your name in the presentation file name and avoiding file names such as “GCET20” or “PRESENTATION” to avoid confusion. Technical assistance will be available in the conference venue throughout the conference. Presenters should be aware of their additional duties as moderators, if applicable – see below.

Duration

The time available for each parallel session is one hour and forty-five minutes. Depending on the number of papers in each parallel session, the moderator/timekeeper can arrange the schedule of the session in order to enable fair treatment of all presenters and allow sufficient time for discussion.

Moderators

Moderators of parallel sessions are always the last presenters of that session. Their task is to introduce the presenters and their topics as well as to stimulate and moderate the discussion. As all presenters, they have to be in the room ten minutes prior to the start of the session and check about the presence of each session speaker and the availability of all presentation files in the computer of that room. Moderators will also act as timekeepers, ensuring that the available time is equally divided across all presentations, providing a “5-minutes-left” and “Time’s up” reminder to the presenters when necessary.

Conference Sponsors and Supporters



British
High Commission
Nicosia



Climate-KIC

Climate-KIC is supported by the
EIT, a body of the European Union



EAERE

European Association
of Environmental and
Resource Economists



**Nordic
Green Growth**

**Environmental Tax
Policy Institute**

Vermont Law School USA

Deloitte.



**Water
Board of
Lemesos**



**VASSILIKO
CEMENT WORKS**
PUBLIC COMPANY LTD

Since 1963

Conference Programme Overview

Wednesday 25 September

- 16:00-18:00 Registration at Conference venue
18:00 Departure from Conference venue by bus
18:30-20:30 Welcome reception at Cyprus University of Technology

Thursday 26 September

- 08:30-08:40 Welcome by Conference Chair
08:40-09:00 Welcome address and official opening of the Conference by
Mr. Harris Georgiades, Minister of Finance of the Republic of Cyprus
09:00-09:30 Keynote speech: Paul Ekins
09:30-10:00 Keynote speech: Yacov Tsur
10:00-10:30 Discussion with the keynote speakers (moderated by Hope Ashiabor)
10:30-11:00 Coffee break
11:00-12:45 Parallel Sessions 1
12:45-13:45 Lunch
13:45-15:30 Parallel Sessions 2
15:30-16:00 Coffee break
16:00-16:05 Welcome address by Ms. Frances Lanitou,
Head of Economic Diplomacy Unit, Ministry of Foreign Affairs of Cyprus
16:05-17:35 Plenary panel discussion: *Carbon Pricing – The Paths Forward*
18:00 Departure to Lofou village
19:00-22:30 Conference Dinner + Young Researcher Award

Friday 27 September

- 08:45-10:30 Parallel Sessions 3
10:30-11:00 Coffee break
11:00-12:30 Plenary panel discussion: *Reducing the Environmental Impact of Shipping*
12:30-13:00 Larry Kreiser award
13:00-14:00 Lunch
14:00-15:45 Parallel Sessions 4
15:45-16:15 Coffee break
16:15-17:45 Plenary panel discussion organised by the Green Fiscal Policy Network:
Equity in Green Fiscal Policy
17:50-18:15 Next year's conference (GCET21) host & Closing remarks

Day 3 (Saturday 28 September)

- 09:30-15:30 Optional excursion by bus (Departure from Conference venue)

Keynote Speakers

Professor Paul Ekins, University College London, United Kingdom



Paul Ekins is Professor of Resources and Environmental Policy and Director of the UCL Institute for Sustainable Resources at University College London. He is also Deputy Director of the UK Energy Research Centre, and the UKERC Co-Director leading on its Energy Resources theme. He is a member of UNEP's International Resource Panel, a member of the Advisory Committee of the Green Growth Knowledge Platform (GGKP) and a Chairman of the Advisory Committee of the Brussels-based expert platform Green Budget Europe. His academic work focuses on the conditions and policies for achieving an environmentally sustainable economy. He is the author of numerous papers, book-chapters and articles in a wide range of journals, and has written or edited twelve books, including *Economic Growth and Environmental Sustainability: the Prospects for Green Growth* (Routledge, London, 2000) and *Environmental Tax Reform: A Policy for Green Growth* (Oxford University Press, Oxford, 2011). In 1994 Paul Ekins received a Global 500 Award 'for outstanding environmental achievement' from the United Nations Environment Programme. In 2015 he was awarded an OBE in the UK's New Year's Honours List for services to environmental policy.

Keynote Speech:

Environmental Taxation: Can the Political Obstacles Be Overcome?

There is near unanimity among economists that a carbon price is an essential part of an effective package to reduce carbon emissions. However, governments' ability to act on this consensus has been constrained by the politics around environmental taxation in general and carbon taxes in particular, such that currently only a small proportion of global carbon emissions are covered by a price, and the majority of these prices, where they exist, is well below the level that is estimated to be necessary to achieve the rates of decarbonisation considered necessary for the Paris agreement targets to be met. The presentation will give a broad overview of developments in this area over the past ten years and address the questions as to: whether the current prospects for carbon pricing are better than they have been in the past; what approaches seem to have the best chance of realising such prospects; and whether conclusions about carbon pricing can be applied to environmental taxation more broadly.

Professor Yacov Tsur, The Hebrew University of Jerusalem, Israel



Yacov Tsur is the Ruth Ochberg Professor of Agricultural and Resource Economics at the Department of Environmental Economics and Management, The Hebrew University of Jerusalem. He received a Ph.D. in Agricultural and Resource Economics from the University of California, Berkeley in 1984. His research deals with natural resource management under uncertainty and catastrophic threats, with a particular focus on water resources. Professor Tsur publishes widely in economic outlets and has been actively involved in advising Israel's Water Authority and the World Bank on issues concerning the use of market-based instruments in water resources management and regulation.

Keynote Speech:

Closing the (Widening) Gap between Water Needs and Renewable Water Supplies: Global Perspective and Local Lessons

The annual supplies of renewable freshwater in any given region are on average stable or even declining due to climate change. Yet, the water needs for food and fibre production as well as for subsistence (drinking, cooking, washing, hygiene) have been growing with population and rising living standards. As a result, a gap was formed between the two, which has been growing in many regions of the world, with dire human and environmental consequences. By 2050, more than 5 billion people in over 80 countries will experience water scarcity, i.e., below 1000 cubic meter of annual freshwater supply per person per year (CMP/y), and about 3 billion will experience absolute scarcity, i.e., below 500 CMP/y. After providing a global outlook of the freshwater gap, I will discuss how it can be managed, drawing on recent lessons from Israel's water economy. This experience shows that a proper combination of demand and supply management policies is capable of closing the freshwater gap and at the same time maintain desirable ecosystems.

Plenary Panel Discussions

1. Carbon Pricing – The Paths Forward

Thursday 26 September, 16:05 – 17:35

A growing number of jurisdictions around the world are implementing or planning to implement a carbon tax or an emissions trading system. Lessons learned by countries that have already implemented some form of carbon pricing may guide the design and implementation of new schemes. This session seeks to solicit concrete suggestions about how best to advance the growth of carbon pricing from the panellists and conference participants.

The panellists have a long and diverse experience in various aspects of carbon pricing. They will reflect on the global knowledge gained so far and will address a variety of aspects of carbon taxes and emissions trading schemes, such as: Which instrument designs work in a simple, effective manner? How to use carbon pricing revenue in ways that will build strong policies, political support and transparency? How can carbon pricing build stronger constituencies among the business sector concerned about competitiveness and households concerned about equity? Are the answers different for carbon taxes and emissions trading schemes? After the panellists' presentations, conference participants will be invited to contribute their thoughts on specific focus questions.

Session Chair:

Janet Milne, Professor and Director of the Environmental Tax Policy Institute at Vermont Law School, USA

Panellists:

- **Susanne Åkerfeldt**, Senior Adviser, Ministry of Finance, Sweden
- **Elena Belletti**, Columbia University, USA
- **Christian De Perthuis**, Professor of Economics; Head of the Climate Economics Chair, Paris-Dauphine University, France

Susanne Åkerfeldt is a Senior Adviser at the Swedish Ministry of Finance, with more than 20 years' experience of managing projects on policy design in the area of energy and environment, seeking solutions and compromises in a politically sensitive environment nationally and at EU level. She has been instrumental in fine-tuning the design of the Swedish carbon tax since the 1990s and pursuing green tax reforms. She serves as Sweden's lead EU negotiator on energy and climate taxation issues and has worked extensively at EU-level to improve and coordinate the design of EU tax and state aid legislation to better reflect the Polluter Pays Principle and encouraging Member States to increasingly use environmental taxes. She is a member of the Subcommittee on Environmental Taxation Committee under the UN Tax Committee as well as of the Scientific Committee of the Carbon Pricing Leadership Coalition.



Christian De Perthuis is Professor of Economics at Paris-Dauphine University and Head of the Climate Economics Chair. He started his career in the agricultural sector, went on to work in leading French research and forecasting institutes and headed the "Mission Climat" of Caisse des Dépôts between 2004 and 2008. His research focuses on the economics of climate change and ecological transition. Author of several articles and books, he is co-author of Green Capital (Odile Jacob, 2013, Columbia University Press, 2015) and co-author of Le Climat, à quel prix? La négociation climatique (Odile Jacob, 2015) He chaired the "Green Tax Commission", which helped the French Government to set up a domestic carbon tax in 2014.



Elena Belletti is an energy and environmental economist specialised in taxation issues. From 2015 to 2019, she worked as an Economic Affairs Officer at the United Nations Department of Economic and Social Affairs, providing advice to tax authorities of developing countries on domestic resource mobilization. She is a member of the United Nations Subcommittee of Experts on Environmental Taxation Issues, and is currently pursuing a Master of Public Administration (MPA) in Environmental Science and Policy at the School of International and Public Affairs, Columbia University. She previously worked for five years in the energy sector. Ms. Belletti holds an MSc in Economics and a Master's Degree in Energy and Environmental Economics.



2. Reducing the Environmental Impact of Shipping

Friday 27 September, 11:00 – 12:30

International shipping is a large and growing source of greenhouse gas emissions. Moreover, emissions of air pollutants from maritime transport (mainly sulphur oxides and particulate matter) are estimated to increasingly affect air quality in the European Union and elsewhere. Global action is needed to tackle these emissions. Besides regulatory initiatives in several jurisdictions, the International Maritime Organisation has adopted regulations to address the emission of air pollutants from ships and has adopted mandatory energy efficiency measures to reduce emissions of greenhouse gases from international shipping. The Organisation is also involved in capacity-building projects to encourage innovation and technology transfer for enabling emission reductions.

Is shipping different from other sectors? Are command-and-control approaches more appropriate than market-based economic instruments? This panel will host experienced speakers with different viewpoints, aiming to stimulate an exciting discussion about the prospects in reducing the environmental impact of a globally very important sector.

Session Chair:

Mikael Skou Andersen, Professor of Environmental Policy, Aarhus University, Denmark

Panellists:

- **Tristan Smith**, Reader in Energy and Transport, University College London, UK
- **Andreas Chrysostomou**, Chief Strategy Officer, Tototheo Maritime, Cyprus
- **Representative from environmental NGO** (to be confirmed)

Tristan Smith is a Reader in Energy and Transport at University College London. He has, since 2010, grown a substantial group focused on modelling and analysis of shipping's efficiency and emissions. He led the 3rd International Maritime Organisation Greenhouse Gas Study, is lead author of ISO 19030, co-chair of World Bank's Carbon Pricing Leadership Coalition Maritime Thread, and has been involved in numerous projects across the academic, industry and policy domains. The group maintains a number of models including GloTraM, which is used by several multinationals to explore shipping's future scenarios and technology evolution. Along with Dr Simon Davies, he is co-founder of University Maritime Advisory Services (UMAS).



Andreas Chrysostomou is a seasoned professional in the shipping industry. Currently he is the Chief Strategy Officer of Tototheo Maritime, which offers a variety of services to the shipping industry with headquarters in Cyprus and branch offices in Greece and Singapore. He holds an MBA and graduated from the University of Newcastle upon Tyne, UK, with a Bachelor of Engineering in naval architecture and shipbuilding. Mr. Chrysostomou, in his long standing career, was the Director of the Department of Merchant Shipping (the Maritime Authority of Cyprus), CEO of Transmed shipping Co. Ltd. and Acting Secretary General of CLIA Europe. He held senior management roles in fields such as safety and security, protection of the marine environment and administration. He also served as the elected Chairman of the Design and Equipment Subcommittee of the IMO and of the Marine Environment Protection Committee (MEPC), one of the main Committees at IMO. He was twice elected and re-elected Chairman of the International Mobile Satellite Organization (a UN agency) and served as member of the Board of Governors of the World Maritime University (WMU). He also served as President of the Institute of Marine Engineering, Science & Technology (IMAREST).



3. Equity in Green Fiscal Policy

Organised by the Green Fiscal Policy Network

Friday 27 September, 16:15 – 17:45

This session will explore the equity dimension of green fiscal policies from different perspectives and some of the features required to build a politically and socially acceptable discourse on green fiscal reform. Panellists will discuss several key issues in this debate including: the tension between efficiency, equity and political feasibility in the implementation of green fiscal policies; the role of equity and distributional considerations in building political feasibility and increasing public support for green fiscal reform; whether or not environmental taxes are inherently regressive; what makes an equitable green fiscal policy; issues of revenue use and 'tax fairness' in the administration of environmental taxes. Panellists will draw on the results of their research and experiences working in developed and developing countries across different sectors.

This plenary session is organised by the Green Fiscal Policy Network. The Network is a partnership established by UN Environment, the International Monetary Fund (IMF) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in 2014 to promote knowledge sharing and dialogue on green fiscal policies. Participating Network partners in this event include: Organisation for Economic Cooperation and Development (OECD), Green Budget Europe (GBE) and Mercator Research Institute on Global Commons and Climate Change (MCC). The Network and this session are supported by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

Session Chair:

Paul Ekins, Director; Professor of Resources and Environmental Policy, Institute for Sustainable Resources, University College London, UK

Opening remarks:

Andreas Matsas, Secretary General of the Cyprus Workers' Confederation (SEK)

Panellists:

- **Kurt Van Dender**, Head of the Tax and Environment Unit, Centre for Tax Policy and Administration, OECD
- **Jacqueline Cottrell**, Senior Policy Advisory, Green Budget Europe (GBE)
- **Jan Steckel**, Head of the working group Climate Protection and Development at the Mercator Research Institute on Global Commons and Climate Change
- **Yacov Tsur**, Professor of Agricultural and Resource Economics, Department of Environmental Economics and Management, Hebrew University of Jerusalem

Andreas Ph. Matsas has been the General Secretary of the Cyprus Workers' Confederation (SEK) since May 2016. He was born in Nicosia in 1970 and holds a BA in History from the University of Reading in the UK, an MA by research in Archaeology focused on the social structure of Cyprus through archaeological evidences, as well as an MA in International Relations - Euro-Med Studies from the same University. He deals with a wide range of trade union affairs, industrial relations issues and socioeconomic and employment policies. He is currently a Council member of the Cyprus Human Resource Development Authority, an Executive Committee Member of the European Trade Union Confederation, as well as a member of the ETUC Employment, Social Policy and Social Dialogue Committees, a European Social Fund Committee Member, as well as a Member of the Cyprus Labour Advisory Body and the Economic Advisory Committee.



Kurt Van Dender is a Senior Tax Economist leading the Tax and Environment Unit, which is part of the [Tax Policy and Statistics Division](#) of the OECD's Centre for Tax Policy and Administration, since 2013. Previously, he was Chief Economist at the International Transport Forum and Assistant and Associate Professor of Economics at the University of California at Irvine. He also worked as a researcher at the University of Leuven (Belgium), where he obtained his Ph.D. with a dissertation on the economics of road pricing. Kurt's work focuses on the use of taxes as instruments of environmental policy, and on tax policy more broadly. Some of his work is published in leading academic journals, and he is an author of several reports published by the International Transport Forum and the OECD. He is a frequent speaker at, and an occasional organiser of, policy research and policy supporting events.



Jacqueline Cottrell is Senior Policy Advisor to Green Budget Europe and has worked with GBE from its inception in 2008. Jacqueline works as an environmental policy consultant for numerous international organisations, including GIZ, the German development agency, the International Institute for Sustainable Development (IISD) and the United Nations Office for Sustainable Development, and has worked for GBE's founder organisation, FÖS, since 2004. Jacqueline has published widely in the field of environmental



economic policy, as co-editor of Critical Issues in Environmental Taxation, Vol VI (Oxford University Press 2009), lead author of Green Revenues for Green Energy (IISD and CNREC 2013), and as contributor to Paying the Polluter (Edward Elgar 2014). Jacqueline has an M.A. in International Peace and Security and is on the international programme committee of the 19th Global Conference on Environmental Taxation.

Jan Steckel heads the working group “Climate and Development” at the Mercator Research Institute on Global Commons and Climate Change (MCC) since 2014. His research focuses on climate change mitigation in developing and newly industrializing countries. More specifically, he works on the distributional effects of carbon pricing and other climate policy instruments, political economy of energy transitions, and drivers of carbonization. His research is published in leading academic journals. He has been involved in multiple international assessment processes, including the IPCC and UNEP’s Emissions Gap Report. Before joining MCC, Jan has worked at the Potsdam Institute for Climate Impact research. He received a PhD in economics from Technical University of Berlin.



Yacov Tsur is the Ruth Ochberg Professor of Agricultural and Resource Economics at the Department of Environmental Economics and Management, The Hebrew University of Jerusalem. He received a Ph.D. in Agricultural and Resource Economics from the University of California, Berkeley in 1984. His research deals with natural resource management under uncertainty and catastrophic threats, with a particular focus on water resources. Professor Tsur publishes widely in economic outlets and has been actively involved in advising Israel’s Water Authority and the World Bank on issues concerning the use of market-based instruments in water resources management and regulation.



Larry Kreiser Award

The Larry Kreiser Award is an honour granted annually to a person who has made a significant contribution to the advancement of environmental taxation and other economic instruments in research or policy. The award is named after Professor Larry Kreiser, a pioneer researcher in the field of environmental taxation and the individual who had the inspiration and energy to begin gathering experts from key disciplines together to create a forum for exchanging the latest research and experience on the use of environmental taxes. This initial idea was the seed that led to this successful series of annual conferences on environmental taxation.

Larry Kreiser, after whom the Kreiser Award for Environmental Taxation is named, is Professor Emeritus of Accounting and former Chairperson of the Department of Accounting at Cleveland State University, Cleveland, Ohio, USA. Dr. Kreiser has over many years been Chief Editor of Critical Issues in Environmental Taxation, the peer-reviewed Edward Elgar publication, which publishes a selection of the best papers presented at the GCET conference series each year.

Previous recipients of the Larry Kreiser award were the following:

<i>Year</i>	<i>Conference</i>	<i>Location</i>	<i>Recipient</i>
2006	GCET 7	Ottawa, Canada	Nancy Olewiler
2007	GCET 8	Munich, Germany	Ernst von Weizsäcker
2008	GCET 9	Singapore	Hope Ashiabor
2009	GCET 10	Lisbon, Portugal	Alberto Majocchi
2010	GCET 11	Bangkok, Thailand	Rae Kwon Chung
2011	GCET 12	Madrid, Spain	Eduardo Merigo
2012	GCET 13	Vancouver Canada	Kathryn Harrison
2013	GCET 14	Kyoto, Japan	Kazuhiro Ueta
2014	GCET 15	Copenhagen, Denmark	Hans J. Larsen
2015	GCET 16	Sydney, Australia	Bob Carr
2016	GCET 17	Groningen, Netherlands	Hans Vos
2017	GCET 18	Tucson, Arizona, USA	Ethel Branch
2018	GCET 19	Madrid, Spain	Pedro Herrera Molina

Overview of Parallel Sessions

Room	Parallel Sessions 1 Thursday 26 Sept. 11:00 – 12:45	Parallel Sessions 2 Thursday 26 Sept. 13:45 – 15:30	Parallel Sessions 3 Friday 27 Sept. 08:45 – 10:30	Parallel Sessions 4 Friday 27 Sept. 14:00 – 15:45
A	Implementation of Green Fiscal Policies I	Road Transport I	Energy II	Emissions Trading and Other Flexible Mechanisms
B	Energy I	Sectoral and Regional Studies	Implementation of Green Fiscal Policies II	Environmentally Harmful Subsidies
C	Case Studies I	Promoting Resource Efficiency	Case Studies II	Road Transport II
Evagoras	Policy Simulations	Aviation and Shipping	Economic Modelling II	Corporate Approaches
Tefkros	Economic Modelling I			Agriculture and Forestry

Detailed Programme of Parallel Sessions

Parallel Sessions 1 (Thursday 26 September, 11:00 – 12:45)

Session 1.1: Implementation of Green Fiscal Policies I (Room A)

Moderator: Stefan E. Weishaar, University of Groningen, Netherlands

How EU State Aid Rules Affect the Design of Environmental Taxes – Susanne Åkerfeldt

From Rhetoric to Reality: Is the Promise of a Lockbox for Carbon Tax Revenue

Durable? – Janet E. Milne

Conflicts and Linkages between the UN Climate Change Regime and the World Trade

Organisation: Developing Countries and Border Carbon Adjustments – Bill Butcher,

Selina Cheng, Natalie Stoianoff

Legal Constraints to Climate Transition in the EU – Stefan E. Weishaar

Session 1.2: Energy I (Room B)

Moderator: Xavier Labandeira, University of Vigo, Spain

Renewable Energy Facilities Taxation – Francisco Cañal

Environmental Tax Planning in the Section of Photovoltaic Solar Energy – José

Eudson Mota Félix, S.L. Rocha, José Maria McCall Zanolchi

The Brazilian Newly Inaugurated Net Metering System: A Case Study of a Win-Win

Model for the Sustainable Development of the Country's Energy Matrix Boosted by

Renewable Sources – José Maria McCall Zanolchi

Energy Taxation and Salience: Evidence and Implications – Xavier Labandeira

Session 1.3: Case Studies I (Room C)

Moderator: Deborah L. Jarvie, University of Lethbridge, Canada

Moral Suasion for Climate Action? The Case of Japan – Tamara Schneider, Sven

Rudolph

Implementing Successful Green Fiscal Policies in Cypriot Local Authorities,

Challenges and Innovative Solutions – Charis Kordatos, Savvas Vlachos

Study on Environmental Protection Tax Law on Low Carbon Development in China –

Chazhong Ge, Feng Long, Qianyang Qu, Zilin Yuan, Xianming Duan

Simplifying the Complexities of Supply Chains, Carbon Emissions, and Carbon

Policies – Deborah L. Jarvie

Session 1.4: Policy Simulations (Room “Evagoras”)

Moderator: Mikael Skou Andersen, Aarhus University, Denmark

A Preliminary Evaluation of South Africa's New Carbon Tax against the 'Faster' Principles for Successful Carbon Pricing – Lee-Ann Steenkamp

Trigger or Time Fuse? An Empirical Framework for Temporal Delay between Policy Implementation and the Market Uptake of Low Carbon Technologies – Veronika Kulmer, Sebastian Seebauer, Michaela Theurl, Willi Haas, Dorian Frieden

The Importance of a Carbon Tax on Timely and Cost-Effective Decarbonization: A Case Study from Cyprus – Chryso Sotiriou, Theodoros Zachariadis

Economic dynamic modelling of climate policy in Poland – Olga Kiuila

Protecting the Marine Environment with Taxes on Farm Nutrients: Evidence from Sweden and Denmark – Mikael Skou Andersen

Session 1.5: Economic Modelling I (Room “Tefkros”)

Moderator: Panos Hatzipanayotou, Athens University of Economics & Business, Greece

Multilateral Reforms of Trade and Environmental Policy of an Environmental Union – Nikolaos Vlassis, Catia Montagna, Avanti Pinto

The Green Paradox, A Hotelling Cul de Sac – Robert Cairns

Comparing the Efficiency of the Alternative Environmental Policies Under the Moral Formation – Eiji Sawada

Cross-Border Consumption Pollution and the Efficiency of Commodity Taxation – Fabio Antoniou, Panos Hatzipanayotou, Michael S. Michael and Nikos Tsakiris

Parallel Sessions 2 (Thursday 26 September, 13:45 – 15:30)

Session 2.1: Road Transport I (Room A)

Moderator: Valeria Di Cosmo, University of Torino, Italy

Favourable Treatment of Electric Vehicles in Austrian VAT Law – A Critical Analysis of the Status Quo Including a Comparison with Foreign VAT Law – Stefanie Geringer

Reassessment of Carbon Tax Design in Light of Recent Developments in the Energy Sector – Fanny Vanrykel

The Indonesian Low Cost Green Car Program Paradox – Hari Prasetyo, Ansari Jowen Salim

Gasoline Price Volatility and Vehicle Choice: The Case for an Adjustable Carbon Tax – Valeria Di Cosmo, Silvia Tiezzi, Stefano F. Verde

Session 2.2: Sectoral and Regional Studies (Room B)

Moderator: Jian Wu, Renmin University of China

Impact of Perform-Achieve-Trade Policy on the Energy Intensity of Cement and Iron and Steel Industries in India – Kaumudi Misra

Production Capacity Trading in China's Coal Industry: Market Based Instrument and Energy Structure Adjustment – Xiaoping Zhang

Sustainable Development and Environmental Goods and Services Industry: Exploring Linkages – Rajiv V. Shah

Environmental Taxation in Africa: Barriers and Policy Options – Elena Belletti

Progress and Some Observations after First Year's Implementation of China's Environmental Protection Tax Law – Jian Wu, Qing Chen, Bill Butcher

Session 2.3: Promoting Resource Efficiency (Room C)

Moderator: Roberta Mann, University of Oregon, USA

Plastics Tax for a Circular Economy – Dora Fazekas, Alistair Smith

Reuse and Circular Economy: In Search of a Legal Framework. The Italian Tax Perspective – Marina Bisogno

Plastic Oceans: Environmental Public Policies, Tax Benefits and the Brazilian Environmental Agenda – Weber Busgaib Gonçalves, Renan Cavalcante Araújo, Pedro Felipe de Oliveira Rocha

Targeting Plastic Pollution with Taxes – Roberta Mann

Session 2.4: Aviation and Shipping (Room "Evagoras")

Moderator: Julia Tumpel, University of Vienna, Austria

The long journey to fair taxation of aviation – Linnea Westman

Digital Data Sharing for Reduced Emissions in Port Visits – Mikael Lind, Andreas Chrysostomou

VAT on Passenger Travel by Air and by Train in the EU – Julia Tumpel

Parallel Sessions 3 (Friday 27 September, 08:45 – 10:30)

Session 3.1: Energy II (Room A)

Moderator: Marta Villar Ezcurra, CEU San Pablo University, Spain

Price Support Schemes in the Service of the EU's Low-Carbon Energy Transition – Theodoros Iliopoulos

The use of Environmental Taxation as a Catalyst for the Use of Solar Energy to Reduce Carbon Emissions in Brazil – Amsterdan Ferreira Rebouças, [Sofia Laprovitera Rocha](#)

An Innovative Use of the Tax Collection System to Promote Energy Efficiency in Buildings – M. Luisa Esteve

Tax Incentives for Photovoltaic Power Self-Consumption: An Analysis of the Spanish Experience – [Marta Villar Ezcurra](#), Carmen Cámara Barroso

Session 3.2: Implementation of Green Fiscal Policies II (Room B)

Moderator: Mona L. Hymel, University of Arizona, USA

Environmental Tax Reform: A Policy Tool Applicable For the Next Decades? – Stefan Speck

Analysis on the Implementation of Environmental Protection Tax and Suggestions for its Improvement – Ping Gao

Australian Carbon Policy: Two Steps Forward, One Step Backwards? – [Evgeny Guglyuvatyy](#), Natalie Stoianoff

Suffocation: Supported by the U.S. Federal Government – Mona L. Hymel

Session 3.3: Case Studies II (Room C)

Moderator: Hope Ashiabor, Macquarie University, Australia

Why we should Not Forget about ‘Equity’ when Reforming Fossil-Fuel Subsidies – Eugenia Merayo

Sustainable Energy Development in Selected EU Members: Frameworks and Policies – Claudia Kettner, [Daniela Kletzan-Slamanig](#), Angela Köppl, Beate Littig, Irina Zielinska

Environmental Taxation and Social Equity in Low- and Middle-Income Economies – Jacqueline Cottrell

The Impact of Fiscal and Political Decentralisation on Environmental Management in Indonesia – Hope Ashiabor, Dahliana Hasan

Session 3.4: Economic Modelling II (Room “Evagoras”)

Moderator: Michael S. Michael, University of Cyprus

International Capital Taxation and Strategic Pollution Control – [Nikos Tsakiris](#), Panos Hatzipanayotou Michael S. Michael

How to Reach Paris: A Comprehensive Long-Term Energy-Economy Scenario for Austria – [Ina Meyer](#), Mark Sommer, Kurt Kratena

Environmental Regulation and Mandatory Disclosure Programs – Jihad Elnaboulsi

Inter-Industry Linkages and Air Pollution: Evidence from the European Union – Elias Giannakis

Strategic Environmental Tax Policies with Nontraded Goods, Capital Mobility and Consumption Pollution – [Michael S. Michael](#), Panos Hatzipanayotou, Nikos Tsakiris

Parallel Sessions 4 (Friday 27 September, 14:00 – 15:45)

Session 4.1: Emissions Trading and Other Flexible Mechanisms (Room A)

Moderator: Jakob Skovgaard, Lund University, Sweden

Lessons From (Not) Linking Carbon Markets: A Comparative Analysis of the Tokyo-Saitama and New Zealand-Australia Cases – Sven Rudolph, Takeshi Kawakatsu, Elena Aydos, Achim Lerch and Joseph Dellatte

Allowance Trading in the EU ETS: Evidence from EUTL Transaction Data – Claudia Kettner

Analysis of Carbon Credit Bills in Brazil – Denise Lucena Cavalcante, Caroline Cunha Alencar, Felipe Sousa Almeida, Lucas Sampaio Dias Lourenço

Clustering the Adoption of Carbon Pricing Policies: What Politics Price Carbon? – Jakob Skovgaard, Sofia Sacks Ferrari, Åsa Knaggård

Session 4.2: Environmentally Harmful Subsidies (Room B)

Moderator: Annabelle Bladon, International Institute for Environment and Development, London, UK

Recent Trends in Environmentally Related Taxes and Subsidies: The Italian Outlook – Andrea Zatti

Harmful Subsidies to the Environment in the Brazilian Energy Sector – Denise Lucena Cavalcante, Caroline Cunha Alencar, Felipe Sousa Almeida, Lucas Sampaio Dias Lourenço

Fiscal Instruments for Biodiversity in Germany – Kai Schlegelmilch

Why Fisheries Fiscal Reform (Especially Reducing Fossil Fuel Subsidies) Must Be in the Decarbonisation Menu – Annabelle Bladon

Session 4.3: Road Transport II (Room C)

Moderator: Hana Bruhova Foltynova, Jan Evangelista Purkyně University, Czech Republic

“Ecobonus” and “Ecotax”: Two Recent Italian Fiscal Measures to Promote the Decarbonization in Vehicles System – Alessia Tomo

Designing Environmental Taxes to Support Biofuels from a EU State Aid Perspective: The Impact of the Energy Taxation Directive on Assessing Selectivity of the Swedish and Finnish CO₂ Taxes – Torbjörn Schiebe

Motor Vehicle Fuel Tax in Indonesia: Greening the Environment through the Tax – Hari Prasetiyo, Ansari Jowen Salim

Policy-Making towards Sustainable Urban Mobility in the Czech Republic: What is the Reality? – Hana Bruhova Foltynova, Radomíra Jordová

Session 4.4: Corporate Approaches (Room “Evagoras”)

Moderator: Kris Bachus, University of Leuven, Belgium

ESG as an Instrument to Achieve National and International Carbon Emission Reduction Targets in Brazil – Adriana Reis de Albuquerque, Denise Lucena Cavalcante, Eric de Moraes e Dantas

Stranded Assets and Competitive Pricing for Regulated Utilities: A Federal Tax Solution – Tracey M. Roberts

**“If the Government Won’t Tax our Carbon Emissions, We’ll Do it ourselves”:
Potential and Limitations of Internal Carbon Pricing** – Kris Bachus

Session 4.5: Agriculture and Forestry (Room “Tefkros”)

Moderator: Carlo Soncini, University of Parma, Italy

Towards Low-Carbon Development: Implementing Carbon Pricing in Perú – Carlos Trinidad, Ernesto Ortiz

What is the Lowest Possible Cost for Complying with the Biodiversity Target in Swedish Forests, and what is the Value of Climate Benefits? – Magnus Nilsson

Global Warming Policy and Local Environment Taxes for Realization of Low Carbon Society – Shoko Sakai

Curves of Marginal Abatement Cost of Strategies to Improve Feeding in Dairy Cattle Farms: A Case Study in Brazil – Gabriela Mota da Cruz, Caio Monteiro, Sílvia Helena Galvão de Miranda

Reduction of Emissions, Biofuels, Bio Agriculture: How to Combine Tax Exemptions and Circular Economy – Carlo Soncini

Abstracts

01 – HOW EU STATE AID RULES AFFECT THE DESIGN OF ENVIRONMENTAL TAXES

Susanne Åkerfeldt

Cost-effective tools are needed to help countries deliver on the 2015 Paris Climate Agreement. Apart from the climate issue, there are also many other environmental issues at stake, which requires action by Governments. The EU has set political targets and the EU Member States need to step up to meet them. Properly designed environmental taxes can be cost-effective tools to achieve good results. The EU State Aid Rules have a major impact on Member States' room for manoeuvre when it comes to the design of environmental taxes.

The EU Commission has exclusive competence to decide on the compatibility of state aid with the internal market. To ensure predictability and stability for Governments and stakeholders, as well as simplifying the procedures for the assessment of compatibility, the Commission has adopted regulations and guidelines. Of interest to the design of environmental taxes are primarily the General Block Exemption Regulation (GBER) and the Guidelines on State Aid for Environmental Protection and Energy (EEAG).

The GBER as well as the EEAG are time limited and expire by the end of 2020. However, in February 2019, the Commission declared its intention of prolonging them until the end of 2022, giving sufficient time for a proper evaluation of those rules in the form of a fitness check under the so-called State Aid Modernisation Package.

It is essential that the special logic and characteristics of environmental taxes are accounted for when making assessments based on the state aid rules and that those rules are helping and not hindering strivings towards a fossil free society as well as successfully addressing other environmental problems.

I will elaborate on different state aid problems that jurisdictions may encounter when considering designing cost-effective environmental taxes. One question arising is the interpretation of the selectivity criterion, which is one necessary element for a measure to be considered as a state aid (see for example recent judgements by the European Court of Justice in Cases C-233 to C-237/16 on certain regional taxes in Spain). When it comes to finding an aid measure compatible with the internal EU market, questions arising involve the interaction with other EU legislation, such as energy and climate targets, the Energy Taxation Directive and the Renewable Energy Directive. These aspects are important elements of the upcoming evaluation of the current regulations and guidelines post 2020.

Keywords

EU state aid, tax, climate, policy design

Biographical note

Susanne Åkerfeldt has a solid background in policy making at Governmental level. As a Senior Adviser at the Swedish Ministry of Finance, she has more than 25 years' experience of managing projects on policy design in energy and environment. She is Sweden's lead EU negotiator on energy and climate taxation issues as well as related state aid matters. Her experience relates to discussions with other EU Member States and EU Commission Services on e.g. a revision of the Energy Taxation Directive since 2006 and environmental tax matters in the State Aid Guidelines for Environmental Protection in 2001 and 2008 and the Guidelines on State Aid for Environmental Protection and Energy in 2014. On a global level, she's a member of the Carbon Pricing Leadership Coalition's Scientific Committee and an expert in the Subcommittee on Environmental Tax Issues under the UN Tax Committee.

02 – FROM RHETORIC TO REALITY: IS THE PROMISE OF A LOCKBOX FOR CARBON TAX REVENUE DURABLE?

Janet E. Milne

Debates about carbon taxes in political and policy circles inevitably involve discussions about how to use the revenue from carbon taxes. Choices about revenue use will turn on the complex interaction of political strategies, the broader fiscal picture, equity and economic concerns, and environmental considerations. The ultimate choice will mold policymakers' promises to constituents and the public as they describe and promote carbon taxes. Those promises become particularly important when they purport to dedicate the revenue to a specific purpose. Voters and stakeholders will wonder whether promises can and will be kept. Can the revenue actually be put into a secure lockbox to ensure that the revenue is used as promised? Will that lockbox endure over time?

This paper considers the legal durability of promises to earmark revenue. It focuses on three types of revenue dedication: revenue-neutral tax reform, revenue recycling through "dividends" or rebates, and dedication of revenue to spending on climate-related matters. It explores how the legal design of these alternatives and the legal context may influence whether promises are kept in the short and long terms.

While drawing on examples of carbon pricing measures and proposals in North America, the paper strives to identify issues that may apply in other countries as well. Regardless of jurisdiction, policymakers and carbon tax advocates should consider whether their rhetorical promises can translate into legally durable reality. The paper does not advocate for specific policy or political choices about how to use carbon tax revenue. It seeks instead to help inform choices and future research.

Key words:

Carbon taxes, climate change, revenue-neutral tax reform, earmarking, revenue recycling

Biographical note

Janet E. Milne is Professor of Law and Director of the Environmental Tax Policy Institute at Vermont Law School, USA, where she has taught environmental taxation since 1994. Publications include J. Milne, ed., *Environmental Taxation and the Law* and J. Milne and M.S. Andersen, eds., *Handbook of Research on Environmental Taxation*. She is a member of the steering committee for the Global Conference on Environmental Taxation and a co-editor of *Critical Issues in Environmental Taxation*. Before joining the law faculty, she was tax legislative assistant to US Senator Lloyd Bentsen, Chairman of the US Senate Committee on Finance, an attorney at Covington & Burling in Washington, D.C., and worked in the land conservation field. She is a graduate of Georgetown University Law Center and Williams College and clerked for Frank M. Coffin, Chief Judge of the US Court of Appeals for the First Circuit.

03 – CONFLICTS AND LINKAGES BETWEEN THE UN CLIMATE CHANGE REGIME AND THE WORLD TRADE ORGANISATION: DEVELOPING COUNTRIES AND BORDER CARBON ADJUSTMENTS

Bill Butcher¹, Selina Cheng², Natalie Stoianoff³

¹ School of Taxation and Business Law, UNSW Sydney, ² UNSW Sydney,

³ Faculty of Law, University of Technology, Sydney

The links between trade and climate change bring into focus the divergences and the interaction between two separate international regimes – the World Trade Organisation (WTO) and the UN climate regime developed under the auspices of the UN Framework Convention on Climate Change with its various instruments, including the UN Convention on the Law of the Sea, the Montreal Protocol on Substances that Deplete the Ozone Layer and the 2015 Paris Agreement (COP21). As the UN climate regime energizes national policies on climate change mitigation the likelihood of disputes in WTO panels over border carbon adjustments and other trade restrictions likely to be introduced as part of those national mitigation policies also rises.

In light of trade competitiveness and carbon leakage concerns arising from COP21 and other UN climate change agreements it is important that WTO rules support national commitments to the UN climate change regime. Moreover, as part of the effort to bring developing countries into the campaign, consideration must be given to the nature and form of differential treatment afforded to those countries to ensure wide participation and curtail economic disruption.

In this context, this article undertakes a comparative study on the regimes for differential treatment in the WTO and the UN climate regime, with a focus on the treatment of border carbon adjustments and on enforcement mechanisms.

While WTO regulation and the UN climate change regime face similar hurdles in striking an appropriate balance between the protection of regulatory domestic autonomy, sustainable development and free trade, there are significant variations in the methods used by each, largely due to the differences in their overarching aims and objectives. This paper synthesises these variations and seeks to draw conclusions on the appropriateness of the different approaches. It concludes with suggestions on modifications to the existing regimes to maximise their fairness and effectiveness and to minimise the economic and social costs that can be associated with climate change mitigation measures.

Keywords:

WTO, developing countries, carbon tariffs

Biographical note

Bill Butcher is a Senior Lecturer with the School of Taxation and Business Law at the University of New South Wales, Sydney, Australia. His primary research interests are in taxation, particularly the use of tax to achieve environmental protection outcomes, and international business law, in which he has written and presented extensively. He has been appointed by the Australian government to direct extensive commercial law courses as part of Australia's overseas aid program and is a member of the Board of Advisors, Environmental Issues Association. Prior to joining the University, Bill practised as a barrister and solicitor in New Zealand and England.

04 – LEGAL CONSTRAINTS TO CLIMATE TRANSITION IN THE EU

Stefan E. Weishaar

The European Union has assumed the task to significantly reduce greenhouse gas emissions by 40% by 2030 (below 1990 levels) and EU Member States have taken similar targets. The central piece of the EU'S Climate change policy is the EU's Emissions Trading System (EU ETS). Its effectiveness is increasingly undermined by Member State policy measures such as carbon tax schemes that threaten to reinforce the ETS waterbed effect. This paper briefly analyses if the EU ETS design is adequately prepared for this development before examining the discretion of Member States to introduce national measures to foster a domestic climate transition. Particular attention is of course payed to State aid rules, competitiveness and recycling measures.

Key words:

Climate law, Climate transition, EU Law, Law & Economics

Biographical note

Stefan Weishaar is Professor of Law and Economics at Groningen University in the Netherlands, where he leads the Linking Emissions Trading Schemes (LETS) research group. As of June 2016 Stefan is also a research affiliate at MIT Center for Energy and Environmental Policy Research in Boston (USA). He studied economics (drs./M.Sc.) as well as law (LL.M.) at Maastricht University, and Political and Regional studies at the International Christian University in Tokyo (Japan Studies Diploma). In 2007 he obtained his Ph.D. for the 'Law and Economics Analysis of the European Green House Gas Emissions Trading System: Allocation and Competition' at his alma mater.

05 – RENEWABLE ENERGY FACILITIES TAXATION

Francisco Jose Cañal García

A communication is proposed on the study of the fiscal treatment of renewable energy production facilities. It must identify the specific problems that each of the different renewable energy sources present.

The topic presents the following most important points of examination:

1. Qualification as real state property. It must study the evolution of its qualification by the courts and by the tax administration.
2. Spanish taxation of renewable energy production facilities in direct taxation (Corporate Tax and Income Tax of Residents and Non-residents), indirect tax (VAT and ITPAJD) and local tax (Tax on Construction, facilities and works - ICIO-, Tax on Real Estate -IBI-).
3. Consequences of its consideration as assets of special characteristics and their effect on the Tax on Real Estate.
4. Valuation criteria of the facilities for the purposes of determining the tax base. Lack of valuation criteria of renewable energy facilities, in the regulation of technical standards for the valuation of real estate with special characteristics.
5. Applicability of tax benefits on renewable energy production facilities.

The objective of the paper will be to make an overall assessment of the tax treatment of these energy sources and obtain some conclusions, especially in relation to the consistency of their regime and its consistency with the legal treatment they receive in other areas of the legal system and in the context of public policies.

Key words:

Renewable energy, Real estate property, Facilities valuation, Real estate valuation, Legal treatment consistency

Biographical note

Francisco Cañal (male) is associate professor on Tax Law at the University of Barcelona (Spain). Previously at the Universities of Salamanca and CEU S. Pablo (Madrid). Visiting professor in several Universities of Europe and Latin America.

Author of 60 contributions in books and articles in scientific journals and 30 papers in congresses. His research focuses on family income taxation, environmental taxation, tax procedures. He has been part of several competitive research projects.

06 – ENVIRONMENTAL TAX PLANNING IN THE SECTION OF PHOTOVOLTAIC SOLAR ENERGY

Mota Félix, José Eudson, Rocha, S. L, Zanocchi, José Maria Mccall

There is some time tendency is verified in admitting the possibility of segregation of the business activities thoroughly in Brazil. In that way, through the business remodelling, it is possible to organize and to optimize the incident taxation in a die economical group. That conduct is lawful and it matters in legitimate tax planning. Being like this, in analysis to the characteristics of that avoidance strategy, the present study if it proposes migrate it for the plan of the environmental taxation. More specifically around public and private politics that turn about the use of the solar energy. For so much, intends a model of fiscal strategy in that the investors' profit is guaranteed, there be reduction of the tax burden without damage to the fundamental objectives of the Republic and still she can contribute to the maintenance of the healthy environment. With the promulgation of the Agreement of Paris, Brazil ratifies the most recent commitment with the climatic issue. In that way, measures to implement and to perfect neutralization techniques and reduction of the levels of emission of carbon should be encouraged. The award for results is a practice that can help to reach a long-term goal as the maintenance of the global medium temperature below 2º C. Report of the Group of Photovoltaic Solar Work, linked to the Ministry of the Development, Industry and External Trade (MDIC), concluded there is about one year. It attests the Brazilian capacity to produce and to distribute electric power starting from the source photovoltaic solar. According to the current panorama, the nation possesses potential of representing among the ten larger world markets in generation of solar energy. However, in spite of that, there are still impediments that commit the competitiveness of the national product, such as the taxation of great part of the inputs and the difficulty of recovery of the tax credits. Then the relevance of the environmental tax planning, while economical tool viable in supporting the solar sector by the own taxpayers' initiative, given the fact that the legislation still doesn't make it satisfactorily.

Key words:

Environmental taxation, Tax planning, Photovoltaic solar energy, Business organization, Importation non-taxation.

Biographical note

Mota Félix: Researcher in the Group of Study and Research in Environmental Taxation (GTA), Federal University of Ceará. UFC (2019). Masters student in Law and Development in the Federal University of Ceará (2019-2020). Researcher in the Group of Study and Research in Administrative and Tax Law (GEPDAT) of the University of Fortaleza - UNIFOR (2018). Specialist in Law and Tax Processes for the University of Fortaleza - UNIFOR (2018). Baccalaureate in Law for the University of Fortaleza - UNIFOR (2015).

Rocha: Graduation in Social Communication, University of Fortaleza (2009) and graduation in Law, Farias Brito College in 2015. Masters student in Law and Development in the Federal University of Ceará (2019-2020). Partner in the Rocha Law Firm and Chief General Corrector in Fortaleza City.

Zanocchi: Baccalaureate in Law, Federal University of Ceará (UFC). Master in Law, UFC (2013). He has experience in the area of the Law, with emphasis in International Law, acting mainly in the following subjects: International, Environmental Commercial Law, International Law, Intellectual Property and External Trade, Commercial Law, Foreign Investment and Arbitration.

07 – THE BRAZILIAN NEWLY INAUGURATED NET METERING SYSTEM: A CASE STUDY OF A WIN-WIN MODEL FOR THE SUSTAINABLE DEVELOPMENT OF THE COUNTRY'S ENERGY MATRIX BOOSTED BY RENEWABLE SOURCES

José Maria McCall Zanocchi

Normative Resolution 482/2012 of the Brazilian Electricity Regulatory Agency (ANEEL) inaugurated the Brazilian net metering system, thereby allowing low voltage captive consumers of electric energy to install small generators of renewable sources (such as solar panels and Eolic turbines). The Resolution sets forth the general conditions for the access of micro and mini-generation power plants to the electricity distribution grid and creates an electricity compensation system where consumers can offset their energy bills with the energy injected by such plants to the system.

It was only on the year of 2015 that ANEEL approved substantial modifications to Resolution 482 that further “democratize” the access conditions to the new net metering system, by setting forth a wider variety of schemes such as the “remote auto consumption” and the “shared generation” models; the later admitting low voltage captive consumers to participate through structures such as condominiums and cooperatives.

The model sets forth market-base instruments for energy efficiency that have been combined with tax incentives so as to induce desired sustainable patterns of production based on renewable sources and also the substitution of carbon intensive alternatives such as diesel generators and thermal electric power stations fueled by coal.

This year of 2019, one of the largest Brazilian Distribution Utility Companies - Cia. Energética de Minas Gerais S.A. (CEMIG) - switched on a 16.000-panel solar plant in Minas Gerais state with a total output of 5MW, on the concession area known to have the highest energy tariff in Brazil. The photovoltaic (PV) facility was developed through subsidiary Cemig Geração Distribuída (Cemig GD) in partnership with Grupo Mori Solar Energia at a cost of BRL 18.5 million (USD 4.9m/EUR 4.4m). Located in a 230,000 sq m area in the city of Janaúba, the photovoltaic park is the first mini-generation plant dedicated to meet the consumption of low voltage customers. More specifically, its output will be supplied to small businesses in the city's Central Market and to companies and industries associated with Minas Gerais' Federation of Industries (fiemg).

The aim of the paper will be to study the practical case as a win-win model for the sustainable development of the country's energy matrix boosted by renewable sources. The objective will be to provide empirical cases that can be reproduced in other countries as a good example of Economic Policies for Low-Carbon Development.

Key words:

Net metering, Energy Efficiency, Sustainable Development, Renewable Energy.

Biographical note

Student for Doctor of Juridical Sciences at the Federal University of Ceará (UFC). Master at Law by the UFC (2013). Post graduate by the Catholic University of Rio- PUC-Rio (2004). Bachelor's at the Faculty of Law of the UFC (2002). He has experience in Law, focusing on International law, acting on the following subjects: international trade, environmental law, intellectual property, commercial and investment law and arbitration.

08 – ENERGY TAXATION AND SALIENCE: EVIDENCE AND IMPLICATIONS

Xavier Labandeira

There is growing academic evidence that shows that the reaction of consumers to tax changes is not uniform, but rather depends on the salience of the tax, that is, the ability of taxes to be perceived by agents. In the case of the energy sector, the literature shows that consumers react more to tax changes than to equivalent changes in prices, because the former are usually accompanied by media coverage that makes them more visible, as well as by the fact that tax-induced price changes are thought to be more persistent than other (fluctuating) energy price changes. This phenomenon has important implications, since it assumes that the use of traditional estimates of the price elasticity of energy demand to assess the effects of energy/environmental tax policies is likely to underestimate the response of consumers, thus generating inadequate predictions of the effects of the policies on tax collection, energy demand and associated emissions. Likewise, the degree of salience of the tax will influence its collection capacity, the incidence of the tax on consumers and producers, its distributive impact on households and its social acceptance, so that political decision makers could modify it according to their objectives. So far academic literature on tax salience in the energy sector has focused almost exclusively on automobile fuel taxes, although there are some studies that indicate that public interventions that increase salience of electricity prices or expenditures can significantly affect household demand for electricity.

This paper presents a comprehensive review of the academic literature on these matters and discusses its relevance for policy making. Moreover, based on quasi-experimental evidence that takes advantage of a major electricity price reform recently implemented in Spain, the article provides evidence of strong regulatory price salience in the scarcely studied electricity domain.

Key words:

Taxation, Elasticities, Salience, Electricity, Car Fuels

Biographical Note

I am a professor in the Department of Applied Economics at the University of Vigo where I teach public and environmental economics. I am also a director of Economics for Energy, a private research center that specializes in the analysis of energy issues in Spain. The center is participated by universities, firms and foundations, and cooperates with analogous international institutions. I am a member of the UN Intergovernmental Panel on Climate Change (IPCC) for the elaboration of its Fifth and Sixth Assessment Reports. Moreover, between 2014 and 2017 I was the director of the Florence School of Regulation-Climate at the European University Institute in Florence. My research lies in the boundaries between climate, energy and public economics. In my academic work I have always attempted to respond to relevant socio-economic issues and to diffuse academic findings. In this sense, I am member of the EAERE's Policy Outreach Committee since 2018.

09 – MORAL SUASION FOR CLIMATE ACTION? THE CASE OF JAPAN

Tamara Schneider and Sven Rudolph

Can moral suasion and ethical behaviour really help in solving the climate crisis? Significant global warming is now considered unavoidable, but hope persists that the temperature increase can still be kept below 2°C above the pre-industrial level, a level, which is considered to allow ecosystems and humankind to adapt. Hence, a reasonable combination of climate mitigation and climate adaptation is paramount. Some researchers and practitioners consider moral suasion a relevant tool in both realms, while others argue that necessary transformations can only be achieved by comprehensive regulation and pricing instruments.

Against this background, in a unique interdisciplinary collaboration between an art historian and an economist, we first look at moral suasion and morality-based behaviour from two distinct perspectives: Based on an iconological art history approach we show the importance of moral-based action, using a selection of artistic disaster responses to the 2011 triple catastrophe in Japan as an example. From an ecological economics perspective we then discuss the relation between intrinsic, morality-based motivation and extrinsic, monetary incentive-based motivations for environmental protection.

As Japan is well-known for its strong ethical foundation on the one hand and a particular set of climate policy measures on the other hand, secondly, we study selected examples of voluntary climate action in Japan, both in the realm of individuals and firms. Finding cursory empirical evidence for our theoretical hypotheses, we mainly conclude that moral suasion and ethical behaviour is particularly promising in the case of emergencies, low-cost action, and when addressed to individuals, while regulations and price incentives are necessary for achieving deep emission cuts in high-polluting, profit-maximizing firms.

Key words:

Climate policy, moral suasion, art history, economics, Japan

Biographical note

Tamara Schneider is lecturer at the Department of Global Communication at Doshisha University, Kyoto, Japan. She holds a Dr. phil. from Kassel University, Germany, where she also has received her Magister Artium M.A. in German and English Philology as well as Art History. Her early research focused on the reception of Japanese art in Europe. Now Tamara's general interest lies in intercultural relations and reflections on nature in art. Currently, she is working on contemporary artists' response to man-made and natural disasters.

10 – IMPLEMENTING SUCCESSFUL GREEN FISCAL POLICIES IN CYPRIOT LOCAL AUTHORITIES, CHALLENGES AND INNOVATIVE SOLUTIONS

Charis Kordatos, Savvas Vlachos

The Paris agreement was a necessity for preventing climate change and strengthening the global response towards sustainable, climate resilient cities. The active involvement of the local authorities to the new climate and energy targets is indispensable, playing decisive role for states' strategies achievement. Many European countries, among them Cyprus, have applied fiscal policies promoting energy efficiency, RES, reduction of wastes etc., towards a greener economy and a higher quality of life. However, when the green fiscal policies are shifted to local level for implementation, the successful application is surrounded with many barriers.

Although many local authorities in Cyprus have committed to the Covenant of Mayors initiative for implementing sustainable energy and climate actions, limited competences and authorization in their territory withhold effective solutions. Consequently, local authorities in Cyprus were unable to introduce a new green taxation category and further support the sustainable energy and climate action plans in place.

An innovative three-way approach was identified and promoted in two municipalities, Nicosia and Lakatamia Municipality, for a successful application of green taxation and practices. The first step was the analysis of the current legislative framework and how the green fees can be adapted inside a taxation category without any Law revision. The second step was the selection of a suitable taxation category for each municipality where the green fiscal policies will be approved and applied in their territory. Finally, the third step was the establishment of a green -revolving- fund from which the revenues of the green taxation will finance sustainable actions supporting RES and energy efficiency measures.

The results were impressive given the fact that many times in the past, Cypriot local authorities have been trying to apply green taxation without any success. Nicosia Municipality has approved green taxation under Hotel Accommodation Tax and the revenues collected will compensate all the Hotels in its region, with free Energy Audits as well as the funding of two awareness events each year. Lakatamia Municipality has engaged an amount from the recent increase of the waste management fees for the development of an educational corner inside the municipal waste (green) point. This interactive educational corner will increase awareness and will become a destination for school trips. All the actions for the application of green fiscal policies in the Cypriot municipalities were co-financed by the European Regional Development Fund's Interreg MED Programme, project [LOCAL4GREEN](#).

Key words:

Green Fiscal policies, Green Taxation, Cypriot Local Authorities, Climate Change, SECAPs

Biographical note

Mr. Charis Kordatos is an Environmental Officer and EU programmes Coordinator at the Cyprus Energy Agency. He is a Forester/Environmental Scientist and holds an MSc in Environmental Biology. He joined the Cyprus Energy Agency in 2009 and has extensive experience in the realization of Environmental Impact Assessments on the installation of large-scale RES projects. He is also familiar with the Covenant of Mayors methodology for Sustainable Energy and Climate Action Plans and supports local authorities for implementing sustainable actions and projects towards climate adaptation.

11 – STUDY ON ENVIRONMENTAL PROTECTION TAX LAW ON LOW-CARBON DEVELOPMENT IN CHINA

Chazhong Ge¹, Feng Long¹, Qianyang Qu² Zilin Yuan¹ and Xianming Duan²

¹ Chinese Academy for Environmental Planning, ² Hangzhou Dianzi University

On January 1, 2018, China had officially adopted and practiced Environmental Protection Tax (EPT) Law and collected EPT from polluting industrial sources. Studies conducted have shown that there is wide difference on the provincial tax rates and the tax deduction policy is of help for the better environmental improvement (Ge *et al*, 2018a, Ge *et al*, 2018b). With the Chinese governmental institutional reform being taken last year, CO₂ control has been delegated to Ministry of Ecology and Environment from National Development and Reform Commission, making it possible for co-benefit of CO₂ and conventional pollutants so as to realize low carbon development (LCD). Whether does the EPT Law contribute to low carbon development in China. This paper will first review the existing literature between environmental tax (possibly including the pollution levy by which the tax was shifted) and LCD, construct the analytical framework for the analysis of the linkage between environmental tax and LCD, conduct empirical study using the sector data, draws the conclusion of EPT Law on LCD and proposes recommendation on how to use EPT law to promote LCD in China.

Key words:

EPT Law, Tax rate, pollutants, Low carbon development

Biographical note

Mr. Ge Chazhong is a Professor and Director of the Institute of Environmental Policy Studies, Chinese Academy for Environmental Planning, has been working on environmental planning, environmental policy studies and the use of economic instruments for environmental protection since 1997. He has currently been involved in the projects such as the study on environmental economic policy and sectoral policy of air pollution control, the draft of 14th national environmental protection planning, and the review on national environmental taxation policy in China.

12 – SIMPLIFYING THE COMPLEXITIES OF SUPPLY CHAINS, CARBON EMISSIONS, AND CARBON POLICIES

Deborah L. Jarvie

The terms ‘carbon pricing’ and ‘supply chain’ have both become increasingly recognizable phrases in all corners of the planet, yet there is much that is still not well understood about these concepts, and the relationship between the two within a comprehensive system remains a mystery to many. This paper aims to shed light on this complex relationship by examining the internal transactional frameworks of supply chains and the external impacts and influences of carbon emissions and policies, within a comprehensive framework designed to highlight significant connections, and identify leverage points for effective environmental tax policy.

International supply chains are discussed in the paper from a ‘cradle to grave’ perspective for various sectors, examining factors associated with resource inputs, transformative production practices, distribution to consumers, and reverse logistics. Externalities resulting from the various points of the supply chain are then linked to carbon policies from the likes of the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), national road and rail transportation environmental frameworks, and government regulated procurement and manufacturing sectors.

From a theoretical perspective, the paper also discusses the literature on top-down environmental input-output macro models, bottom-up process analysis micro models, and hybrid combinations of both, identifying examples of these models in current policy frameworks as they pertain to elements within supply chains. The connections made between the theory, current policies in place, and supply chain practices, allows for not only a clearer understanding of the links between carbon emissions and carbon policies, but also provides a framework from which decision-makers can better assess the most effective and efficient strategies for cleaner economic growth.

As supply chains continue to grow in complexity, and carbon emissions continue to rise, dynamic yet clearly designed models for sustainable growth based on sound economic and environmental policies, such as the framework proposed in this paper, must be at the forefront of national and international discussions.

Key words:

Carbon, supply chain, sustainable growth

Biographical note

Dr. Deborah Jarvie is a faculty member with the Dhillon School of Business at the University of Lethbridge, in Alberta, Canada, where she has an extensive teaching history in the fields of accounting, taxation, and various business and management practices. Much of Deborah’s research focuses on environmental taxation, and she has published and/or presented on numerous occasions on topics such as carbon pricing, national environmental tax policy, and the use of scientific research and experimental development and accelerated capital cost allowance for the promotion of innovation for environmental resilience. Her research topics have addressed the energy sector, water resources, international policy comparisons, and taxation within supply chains, to name a few. Deborah’s current projects address the role of environmental taxation and market based instruments within international supply chains, and the sustainable integration of energy, water, and food.

13 – A PRELIMINARY EVALUATION OF SOUTH AFRICA'S NEW CARBON TAX AGAINST THE 'FASTER' PRINCIPLES FOR SUCCESSFUL CARBON PRICING

Lee-Ann Steenkamp

South Africa's economy is heavily reliant upon coal, which makes it one of the dirtiest energy producers in the world. Ranking among the top 20 carbon dioxide (CO₂) emitters globally, the country will have to implement strict(er) policies to ensure its commitments under the Paris Agreement on Climate Change are honoured. One such policy is the new carbon tax.

Following a decade of public consultations, debates and implementation delays, the proposed carbon tax is expected to take effect on 1 June 2019. To reduce the financial impact on businesses, the tax will be implemented in a phased manner, at an initial rate of R120 per ton of CO₂e. Parties that conduct various activities in the manufacturing, construction, mining and transport sectors will be affected. To cushion the blow, various transitional tax-free allowances will be allowed. Additional relief will be offered by way of complementary measures, for example, a reduction in the electricity levy, as well as other measures, such as carbon offsets which firms can use to reduce their carbon tax liability. Some revenue recycling will likely occur, which should help in mitigating short-term negative impacts on the economy and employment sector.

Despite the extensive consultation process, the carbon tax has attracted many disparate views, including competitiveness concerns and distributional issues. Moreover, the accompanying regulations for carbon offsets have not yet been finalised and released. Consequently, while polluters likely have a good idea of the maximum amount of tax they will have to pay, there is still some uncertainty around the offsets that might be applicable to reduce the tax liability. The OECD and World Bank Group have jointly developed five criteria to assist with the successful and cost-effective design of carbon pricing schemes. These FASTER principles refer to fairness; alignment of policies and objectives; stability and predictability; transparency; efficiency and cost-effectiveness; and reliability and environmental integrity.

It is against the backdrop of policy uncertainty that this paper will conduct a preliminary evaluation of South Africa's carbon tax against the global framework for efficient carbon pricing, *viz.* the FASTER principles. As the carbon tax is still to be implemented and due to the fact that it will be some years before meaningful empirical data can be gathered, this review is aimed at serving as a precursor for future research.

Keywords:

Carbon pricing, Carbon tax, Climate change, FASTER, Paris Agreement

Biographical note

Lee-Ann Steenkamp is a senior lecturer in taxation at the University of Stellenbosch Business School (USB), South Africa. She holds a Master's degree in Taxation and is a registered Master Tax Practitioner (SA). Her research focuses on 'green tax' issues, including biodiversity conservation, the taxing of energy use in developing countries and most notably South Africa's impending carbon tax. Lee-Ann obtained her PhD in Public Law from the University of Cape Town, wherein she examined the transition from the old Kyoto Protocol to the new Paris Agreement on Climate Change. She is a member of the steering committee for the International Conference on Clean Electrical Power, held every two years in Italy. Lee-Ann represents USB as an academic stakeholder on South Africa's National Climate Change Committee.

14 - TRIGGER OR TIME FUSE? AN EMPIRICAL FRAMEWORK FOR TEMPORAL DELAY BETWEEN POLICY IMPLEMENTATION AND THE MARKET UPTAKE OF LOW-CARBON TECHNOLOGIES

**Veronika Kulmer¹, Sebastian Seebauer¹, Michaela Theurl²,
Willi Haas², Dorian Frieden¹**

¹ Joanneum Research Forschungsgesellschaft mbh, Austria

² University of Natural Resources and Life Sciences, Austria

Transforming the transport and energy sector of Western industrialised countries towards low carbon emissions calls for swift action. Decision-makers need to know how fast low carbon policies unfold on a society/regime level in order to stay on track in transition pathways. Financial incentives such as purchase subsidies or feed-in tariffs are the dominant policy option; however these measures often have no immediate impact but take time until market actors react to the policy impulse. This lag is often neglected in ex-ante modelling analyses. This paper presents a methodological framework to estimate impact lags between policy implementation and market diffusion. On the example of Austria and three low carbon technologies (electric and hybrid vehicles, heat pumps in residential buildings, and photovoltaics panels on private roofs), in different stages of market penetration, we show how swiftly policy-market interactions unfold.

The impact lag is defined as the timespan between policy actions, such as the passing of laws or regulations, and their actual impact on the market diffusion of technologies. We analyse the dynamic interactions between two parallel processes over time: the policy vector, describing how and when technology-specific policies are issued by authorities; and the technology diffusion vector, describing the market share of a certain technology. The evolution of the policy vector is reconstructed from document analysis and expert interviews. Multiple processes and actors are joined to narratives that identify crucial milestones in Austrian policy deployment. The technology diffusion vector is established from longitudinal market statistics. A change point analysis identifies statistically most likely points in time when the first-order derivative of the technology vector changed. These turning points are then correlated to preceding events or to shifts in funding rates.

Our preliminary results point to different types of lags: the pull-forward effect, one-time effects and triggers for growth. For example the province of Vorarlberg heavily subsidized the acquisition of electric vehicles, which led to an increase in market adoption. Yet, when subsidies were discontinued, the diffusion curve fell back to the trend prevalent in other provinces (pull-forward effect). In photovoltaics a substantial change in the national funding regime initiated a rapid continuous market uptake (trigger for growth effect).

Key words:

Low carbon transformation, Energy efficiency technologies, Policy assessment, Change point analysis, Empirical ex-post analysis

Biographical note

V. Kulmer is a post-doc scientist with an international background in the field of macroeconomic impact assessment of environmental policies and technologies. She has advanced knowledge in mathematical modelling, computable general equilibrium modelling and empirical policy analysis. Her research interests comprise climate and energy policy related issues as well as their potential impacts on the economy and environment. Trained as an economist, her current research focuses on climate change mitigation measures and low carbon transformation of the transport and energy sector.

15 - THE IMPORTANCE OF A CARBON TAX ON TIMELY AND COST-EFFECTIVE DECARBONIZATION: A CASE STUDY FROM CYPRUS

Chryso Sotiriou and Theodoros Zachariadis

Decarbonization by the mid-21st century requires strong commitment to greenhouse emission abatement measures. In European countries abatement seems to be most challenging in non-ETS sectors, i.e. those sectors of the economy which are not subject to the European Union's Emissions Trading System, and most notably in the transport sector. Achievement of long term targets is further complicated by the fact that national emission reduction pledges are usually made for the medium term, e.g. for 2030; achieving medium term targets without taking into account the long term can lead to a lock-in effect, whereby policies to reduce emissions in the medium term may lock countries in pathways that cannot lead to strong decarbonization in the longer term.

In this paper we analyse cost-effective emission abatement options for the small EU Member State of Cyprus, which is faced with similar challenges. Because deep decarbonization in the country's non-ETS sectors is very demanding, we consider the adoption of cost-effective greenhouse gas reduction measures coupled with the implementation of a gradually increasing carbon tax in these sectors. For this purpose we combine a long-term energy forecast model that is used for national energy planning with a multi-objective constrained optimization model that examines least-cost greenhouse gas emission abatement pathways. The latter takes into account emission reduction objectives for two years: 2030 and 2050, and incorporates assumptions on the speed of implementation of each measure, which expresses technical and behavioural inertia in the deployment of a measure. We also take into account environmental side-benefits of greenhouse gas emission abatement, by accounting for damage costs from the emissions of air pollutants. We develop a number of alternative scenarios with carbon tax levels of varying level and varying speed and compare their feasibility to turn Cyprus into a low-carbon economy and their corresponding costs.

Key words:

Carbon tax, Climate change, Emissions abatement, Greenhouse gases, Optimisation

Biographical note

Chryso Sotiriou is a doctoral student at the Cyprus University of Technology. She has obtained a B.Sc. degree in Physics from the Aristotle University of Thessaloniki, Greece, and a M.Sc. degree in Energy Resource Management from the Cyprus University of Technology. Her research interests are in techno-economic assessment of climate change mitigation strategies taking into account the economic side benefits from avoided external costs due to decarbonization.

16 – ECONOMIC DYNAMIC MODELLING OF CLIMATE POLICY IN POLAND

Olga Kiuila

Poland faces unique challenges in its energy transition due to extreme dependence on coal. The country is responsible for 8% of EU emission, making it the sixth biggest emitter in the block. The Polish energy sector is dominated by electricity produced from bituminous coal and lignite (around 90%). The main reason is historical, as after WW2 it was decided that Polish energy security will be built on domestically available coal resources. Poland currently uses massive subsidies to boost the coal sector.

Energy is a crucial economic input circulating in the economy, widely utilized as production factor and consumed in different forms by households. For this reason, any changes in energy sector will have a preponderant impact on the entire economy, thus partial equilibrium modeling is not always sufficient. We propose a dynamic intertemporal hybrid general equilibrium modeling that incorporates energy technologies (bottom-up approach) directly into a macroeconomic structure (top-down approach). Using such model we simulate the economic effects of sector regulations and new policy targets within environmental taxation scenarios, by accounting for complex set of linkages between energy sector and other parts of economy. Those scenarios assume, in different proportions, increasing use of nuclear energy, renewable sources and natural gas in exchange for reduction of carbon. For each scenario, the model provide number of performance measurements such as social welfare and other efficiency indicators like investment to GDP or investment to employment ratio.

Our simulation results suggest that there are no free lunches. No realistic energy mix allows to achieve sustainable positive economic growth when considerable emission reduction is to be achieved. The price on CO₂ will exceed EUR 100 for 30% emission reduction with respect to business-as-usual scenario. Gradual phase-out of coal requires focusing on biomass technology (the first best), nuclear and wind power (the second best).

Key words:

Computable general equilibrium modeling; Decarbonisation; Energy technologies

Biographical note

Olga Kiuila is an Associate Professor at the University of Warsaw (Poland). Her Habilitation (2014), Ph.D. (2000), and Master (1996) Degrees has been completed at that university. The area of interests is environmental and energy economics, and computable general equilibrium modelling. She has been awarded in 2001-04, 2006-08, 2015, and 2019 by the Rector of the Warsaw University for the best publications. In 2001 she got a visiting lecturer position at the Rice University (USA). In 2008-10 she got a PostDoc fellowship at the Swiss Federal Institute of Technology in Zurich. In 2014-16 she worked for the Luxembourg Institute of Statistics and Economic Studies. She has experience in advising to Polish ministries and international authorities. The current research has been prepared by the financial support of the Polish National Science Centre under the project #2017/25/B/HS4/01143.

17 – PROTECTING THE MARINE ENVIRONMENT WITH TAXES ON FARM NUTRIENTS: EVIDENCE FROM SWEDEN AND DENMARK

Mikael Skou Andersen

According to the second holistic assessment of the Baltic Marine Environment Protection Commission (HELCOM), the aggregate nutrient loads to the Baltic Sea have over the past two decades been reduced by 13 per cent for nitrogen and 19 per cent for phosphorus. Despite improvements virtually the entire Baltic Sea (97%) remains eutrofied, with large hypoxic areas in the central basin. Recent modelling of nutrient flows in the Baltic Sea has suggested that especially phosphorus is a long-lived pollutant that mixes over long distances in the marine environment, while the riverine nitrogen nutrients are sequestered to some extent in the coastal rim. Annex III of the Helsinki Convention provides a list of measures for reducing plant nutrients from farming, which signatories agreed in the late 1990's. Experiences with economic instruments in individual countries warrant interest as HELCOM prepares for updating its Baltic Sea Action Plan in 2020.

Denmark's tax on phosphorus in animal feed came into effect in 2005 with a tax rate of DKK 4 (EUR 0.53) per kg of phosphorus. It targets commercial animal feed phosphate and aims to reduce leaching to surface waters and prevent saturation of soils with phosphorus. The tax has improved overall efficiency in the use of animal feed, and consumption of mineral phosphate in animal feeds was reduced by about 2,000 tonnes since the introduction of the tax. The tax was chosen as one of the most cost-effective means for reducing nutrient losses, following analysis in a Government committee with civil servants from several ministries and representatives from farmers and NGOs. Still, the tax on phosphorus would have been environmentally and economically more effective if applied to all sources, including also to mineral fertilizer.

Sweden's tax on mineral fertilizers initially targeted both nitrogen and phosphorus, but cadmium present in phosphorus subsequently replaced the latter tax base. The tax rate for nitrogen of SEK 1.80 (EUR 0.18) per kg N was relatively modest, while the tax rate for cadmium at SEK 30 (EUR 3) per gram was more significant. Two recent analyses have been able to disentangle impacts of the tax, finding a net reduction in nitrogen use of annually about 10,000 tonnes of N. The cadmium tax component has also been found to have been environmentally very effective.

Key words:

Environmental taxation; Farm nutrients; Baltic Sea; policy instruments; eutrophication

Biographical note

I am a full Professor of environmental policy analysis. My research addresses the greening of the economy, with focus on policy instruments, regulations and external costs related to environment and energy, especially the relationship between market-based instruments, governance institutions and technological innovations as a remedy for preventive and foresighted policies. My research has frequently been interdisciplinary, connecting with insights and models from the natural sciences, aiming to inform decision making in specific areas. I am presently coordinating the project BONUS TOOLS2SEA (Policy tools for Baltic Sea nutrient management), a BONUS synthesis project, funded jointly by the EU and the Swedish Research Council FORMAS. My publication list counts 165 articles, chapters and reports, including '*Handbook of research on environmental taxation*' (co-edited with prof. Janet Milne). I am member and vice-chair of the Scientific Committee of the European Environment Agency (EEA), a body of the European Union.

18 – MULTILATERAL REFORMS OF TRADE AND ENVIRONMENTAL POLICY OF AN ENVIRONMENTAL UNION

Catia Montagna¹, Avanti Pinto² and Nikolaos Vlassis¹

¹ University of Aberdeen, Business School, Department of Economics,

² University of St Andrews, School of Geography and Sustainable Development.

This paper analyses environmental and trade policy reforms undertaken by a subset of countries that are bound by an environmental agreement (referred to as an environmental union). A perfectly competitive general equilibrium model of world trade is used that includes trade tariffs, environmental taxes and international transfers to address trade and environmental distortions. The first-best optimal trade and environmental policies for the union are derived in the presence and absence of transfers and we find that the transfers internalise the negative externalities (trade and environmental) from the non-union countries. Thereafter, starting from an initial arbitrary tariff and pollution distorted equilibrium, the necessary and sufficient conditions for the existence of strict Pareto-improving reforms to be undertaken by the union are developed. Specific reforms are characterised and applied to analyse the change in welfare of the union and non-union countries. We find that, even in the presence of multiple policy options to target multiple distortions, there exists a negative relationship between the change in welfare of the union and that of the non-union countries and it stems from the terms of trade effect. A 3X3 example is used to elaborate on the specific reforms and the conditions under which the union Pareto improving reforms are welfare reducing for the non-union countries. These conditions depend on the relative magnitudes of the terms of trade effect and impact of emissions leakage on global compensated demand. The example is further used to analyse the impact of the reforms on global pollution and we find that under certain conditions, global pollution may increase, despite union policy reforms targeted at reducing their emissions.

Key words:

Environmental Taxation, Trade Policy, Environmental Agreement, Pareto efficiency, Pareto Improving Reforms.

Biographical note

I joined the University of Aberdeen in 2013 as a Lecturer in Economics after obtaining my PhD in Economics from the University of Exeter. Currently, I am Programme Director of two MSc programs: MSc in Petroleum Energy Economics and Finance; Online MSc in Energy Economics and Finance. My research interest lies in the area of Environmental economics, International trade, Public economics and Networks. In particular, I am currently involved in a number of projects investigating, among other things, the direction of emission leakage in the presence of public pollution abatement, Trade creation and trade diversion resulting from Environmental Agreements, Network formation within oil and gas sector.

19 – THE GREEN PARADOX, A HOTELLING *CUL DE SAC*

Robert Cairns

The green paradox is an effect by which an increasing tax per unit on oil production, aimed at tracking damages from CO₂ emissions, induces an increase in world production and a decrease in price in the near term. The increase is a rational response in a Hotelling exhaustible-resource model. We simulate the decisions of a price-taking producer in response to a tax of various shapes. In contrast to a Hotelling model, our extraction technology involves irreversible, lumpy investments in exploration and development. In addition, we assume output from a developed reserve is subject to natural decline at a rate that is determined by the sunk development investment and the geology of the reserve. Decisions are far more complicated, and results far subtler, than in the Hotelling framework. Given a price path, we show that almost any form of tax causes a reduction in the level of development and initial production, thereby contradicting the hypothesis of the green paradox.

Key words:

Green paradox, Natural decline, Exploration and development, Sunk cost, Hotelling resource model

Biographical note

Robert Cairns is Professor in the Department of Economics at McGill University. He has been at McGill since obtaining a PhD in Economics from the Massachusetts Institute of Technology in 1978. His research is in natural-resource economics, especially the economics of non-renewable resources, and industrial organization. The main subjects of his current work are the economic theory of sustainability and the economics of capital and of accounting, including green accounting. He defines what is sustained as minimum level of net income attained over the indefinite future and what is sustainable as the maximum such level. His work on the economics of capital and of accounting is mainly on the activities individual firms or projects and focuses on measuring and accounting for sunk costs.

20 – COMPARING THE EFFICIENCY OF ALTERNATIVE ENVIRONMENTAL POLICIES UNDER THE MORAL FORMATION

Eiji Sawada

So far, most of the traditional researches on the environmental policies have been assumed that economic agents have incentive to reduce pollution emissions only after some environmental policies are introduced. Now, the studies on the experimental economics and behavioural economics provide the evidence to support the effects of the moral cost on the environment relating decision-making and increasing researches come to consider the voluntary pollution reduction in their analysis. However, few researches consider the interaction between the government intervention and the moral cost, except for Brekke (2003) which shows that the intervention on the decision making could change the inherent voluntary activities, while giving the additional incentives in the context of the provision of the public goods. In this paper, we compare the efficiency of alternative environmental policies such as taxes, subsidies and direct control assuming that the government intervention changes the inherent voluntary pollution reduction. In our analysis, we firstly develop a simple economic model with three types of the moral formation which are defined by the difference of actual and ideal value of pollution emissions, net private benefit and social welfare, respectively. After that, based on the developed model, we examine the relative efficiency of the three environmental policies under the moral formation. Finally, we concluded that 1) the relative efficiency among alternative environmental polices depends on the specification of the moral formation, especially, 2) environmental subsidies have the property to inhibit the crowding out of the voluntary pollution reduction and 3) the result of the traditional discussions on price versus quantities is modified by considering the moral formation. Our results show the importance of considering the inherent voluntary pollution reduction and its interaction with government intervention when determining the environmental policy.

Key words:

Comparison of alternative environmental policies, Moral cost, Voluntary pollution reduction, Prices versus quantities.

Biographical note

Eiji Sawada is a faculty of economics at the Kyushu Sangyo University in Japan and is teaching environmental economics and micro economics. His main research interest is the environmental economic theory and its application. Current research projects in progress are 1) Comparison of <Woody Biomass Economy> between Japan and China: From the Viewpoint of Space, Region and Policy (2019 - 2021), 2) International assistance to South Asia and CSR, environmental and social contribution activities of South Asian companies that supports the South Asian economy from outside and inside (2018 - 2019), 3) Application and implementation of nonpoint source pollution policy for wetland conservation in East Asian water area (2016 - 2019), 4) Design theory, demonstration, implementation and proposal based on integration of economic model and physical model for energy supply and demand system construction (2015 - 2019).

21 – ON THE PRINCIPLES OF COMMODITY TAXATION UNDER INTERREGIONAL EXTERNALITIES

Fabio Antoniou, Panos Hatzipanayotou, Michael S. Michael and Nikos Tsakiris

We examine the efficiency of decentralized commodity taxation where consumption tax revenue finances public sector activities related to interregional externalities. We consider two cases; tax revenue finances (i) public pollution abatement in the presence of consumption generated transboundary pollution, and (ii) the provision of an interregional public consumption good, in the absence of pollution. The key result of our study is that in either case, non-cooperative equilibrium origin-based consumption taxes are efficient, while destination-based taxes are not. When consumption tax revenue is lump-sum distributed, neither type of consumption taxes is efficient.

Key words:

Commodity taxation, Origin principle, Destination principle, Interregional externalities, Efficiency, Public goods

Biographical note

Panos Hatzipanayotou is a Full Professor of Economics at the Athens University of Economics and Business. He holds a Ph.D. in Economics from the State University of New York, Stony Brook. He is Research Fellow of CES-ifo, Munich-Germany, the Institute of Economic Policy Studies, and the Centre of Economic and Environmental Research, Greece. He serves as referee of academic journals, as a Chair and Scientific Member of the Organizing Committees of national and international conferences. His research interests include International Factor Mobility; Optimal Commercial Policy and Indirect Tax Reforms; Foreign Aid, Environmental Issues in International Trade. His research appears in Journals such as, Canadian Journal of Economics, *Economica*, *Economics Letters*, *Environmental and Resource Economics*, *Journal of Development Economics*, *Journal of Environmental Economics and Management*, *Journal of Public Economic Theory*, *Journal of Public Economics*, *Oxford Economic Papers*, *Review of International Economics*, *Scandinavian Journal of Economics*, *Southern Economic Journal*.

22 – FAVOURABLE TREATMENT OF ELECTRIC VEHICLES IN AUSTRIAN VAT LAW: A CRITICAL ANALYSIS OF THE STATUS QUO INCLUDING A COMPARISON WITH FOREIGN VAT LAW

Stefanie Geringer

By implementing a special rule in the Austrian VAT system through the Tax Reform Act 2015/2016, electric vehicles which are acquired for the purpose of use in a company are, from the beginning of 2016, treated differently to vehicles powered by combustion engines. Whereas entrepreneurs generally are not allowed to deduct VAT from the remuneration paid for the purchase, rental or lease of vehicles with combustion engines (although they use it in their company), they would widely be refunded the VAT they paid in comparable transactions which involve electric vehicles.

However, this right to deduct VAT is limited and depends on the actual acquisition costs, scaling from a whole or partial deduction of VAT to an exclusion from the right to deduct VAT at all. Thus the right to deduct VAT from the acquisition of electric vehicles follows a three level system in Austria.

This paper provides an overview of the historical background of this specific regulation, including ecological considerations. The Austrian approach to favouring the acquisition of electric vehicles in VAT law is then questioned critically with regard to the goals the Austrian lawmakers aspired to achieve. Finally the analysis implies a comparison to similar regimes in foreign VAT law as well as to OECD recommendations to identify best practices and offer proposals for future legislation.

Keywords

Electric vehicles, Carbon emissions, Right to deduct VAT, Environmentally harmful subsidies, Incentives for sustainable investments

Biographical note

Stefanie Geringer is a research assistant at the Department of Tax Law at the University of Vienna and a tax adviser-in-training at a local tax accountancy firm. In her research she focuses on tax treaty law and limited tax liability of non-resident taxpayers, environmental tax law, taxation of non-profit organisations, taxation of arts and culture as well as taxation of public bodies.

23 – REASSESSMENT OF CARBON TAX DESIGN IN LIGHT OF RECENT DEVELOPMENTS IN THE ENERGY SECTOR

Fanny Vanrykel

With the rise of environmental awareness, development of renewable energy production and consumption has become a central objective of European and national energy policy. Towards this end, European Union (EU) has imposed on EU Member States mandatory target to increase their share of renewable energy production. To achieve this goal, carbon taxes are widely recognized as a relevant instrument. Extensive research literature has studied the implementation of carbon taxes, including questions pertaining to the optimal price of carbon and their design. In this paper, we argue that design of carbon taxes needs to be reassessed in light of recent developments in the energy sector, in particular decentralization of electricity production and peer-to-peer sales of electricity.

Key words:

Carbon tax, Renewable electricity, Peer-to-peer sales of electricity, Decentralization of electricity production, Tax design

Biographical note

Fanny Vanrykel is a F.N.R.S. research fellow at ULiège (Belgium). She is also an associate researcher at the CEREC Saint Louis (Belgium). Her PhD research regards the role of taxation to foster sustainable mobility and is supervised by Pr. Marc Bourgeois (ULiège) and Damien Ernst (ULiège).

24 – THE INDONESIAN LOW COST GREEN CAR PROGRAM PARADOX

Hari Prasetyo and Ansari Jowen Salim

The use of private transportation in Indonesia is one of the leading cause of environmental quality degradation, mainly of the air. Regarding this, the government has the power to move the transportation market to a more environmentally friendly one. One means of reducing emissions of motor vehicles is the implementation of the low cost green car (LCGC) program. The program itself is part of the government's efforts to make less environmentally harmful cars more affordable. The LCGC program is regulated by The Government Regulation Number 41 Year 2013 about Taxable Luxury Motor Vehicles Subject to Sales Tax on Luxury Goods. Under this Government Regulation, while other types of vehicles are subject to taxes ranging from 10 % to 125 % of their base value, cars included in the LCGC program are exempted from the tax on luxury goods. Although the sales of cars included in the LCGC program has been steadily on the rise for the past few years, this could only mean that the use of private transportation is also increasing.

This paper points out that the current program that has been in effect for almost six years is counter-productive and provides a faulty incentive scheme, one that is incapable of achieving its purpose of reducing emissions. First, although the tax incentive scheme works by assigning higher taxes to less energy-efficient vehicles and exempting low cost green cars from the luxury tax, it fails to deter consumers from buying the higher cost vehicles while at the same time opens a whole new market of affordable cars for middle to lower income households. Second, the tax incentive scheme only tackles the problem with motor vehicles, not the fuel itself. This leads to consumers of the low cost green cars switching to less efficient fuels, such as fuels with higher octane rating. This is because there are currently no environmentally-related taxes regarding the use of fuels in Indonesia, providing no disincentives to consumers.

Key words:

Low cost green car, Tax incentives, Motor vehicles, Emissions, Environmentally-related taxes.

Biographical note

Hari Prasetyo, S.H., M.H. is a full time lecturer in Faculty of Law, University of Indonesia. He teaches several subjects, such as Environmental Law, Tax Law, and Administrative Law. He is also an active researcher in the Center for Law and Good Governance Studies in Faculty of Law, University of Indonesia. Several of his works include the paper titled "*In Dubio Pro Natura* as a Principle in Indonesian Climate Litigation, Future and Challenges at Imagining a Different Future: Overcoming Barriers of Climate Justice" which was presented on February 2018 at University of Tasmania, and the poster "Optimizing Environmental Tax to Mitigate the Climate Change: a Study of Indonesian Motor Fuel Tax (PBBKB) to Reduce CO₂ Emission" which was presented at the 2018 IUCN Academy of Environmental Law Colloquium, Strathclyde University, Glasgow.

25 – GASOLINE PRICE VOLATILITY AND VEHICLE CHOICE: THE CASE FOR AN ADJUSTABLE CARBON TAX

Valeria Di Cosmo¹, Silvia Tiezzi² and Stefano F. Verde³

¹ University of Torino, ² University of Siena,

³ Florence School of Regulation Climate, European University Institute

To limit the damages and the risks associated with climate change, global atmospheric concentrations of greenhouse gases must be stabilised within the next few decades. Of all sectors, road transportation has so far proved to be one of the most difficult to decarbonise. Indeed, in most countries, emissions from road transportation have either been stable or increased. In this work we use US individual vehicle data to estimate how household characteristics, gasoline price at the purchase date and price volatility affect the consumer's choice of buying efficient vehicles, measured by Miles Per Gallon (MPG). Our approach differs from the analysis made by the existing literature both for the data considered and the specification used. We use vehicle data instead of household aggregation, and we include portfolio effects, in order to capture the determinants of car's efficiency also taking into account the order of purchasing choices.

Our results show that both the level and the volatility of prices significantly affect the cars' efficiency. Efficiency of the purchased car increases with gasoline price. Moreover, our analysis shows that price volatility is negatively linked to the MPG.

Then, we propose an adjustable carbon tax, which keeps the gasoline price stable and allows to achieve the environmental targets. We consider two different Brent targets and we compare the results with the real gasoline price collected between January 2000 and July 2016 augmented by a fixed gasoline taxation that reflects the social marginal cost of carbon. Our taxation reduces the volatility of the gasoline price compared with a fixed tax. In the first years of the sample, the adjustment component is positive both considering a Brent target of 60\$/barrel and 80\$/barrel. The patterns of the two taxes diverge after the 2008 Brent crisis. When a lower Brent target is assumed, the buffer accumulated with the taxation in the years before 2008 ends, and then after July 2008 the tax follows the fixed tax up to the first months of 2016.

The tax that reflects the higher Brent target of 80\$/barrel has a different path. The flows of revenues accumulated before the Brent crisis in 2008 allows the policy makers to keep the gasoline price quite flat up to 2016. As a result, the more ambitious are the targets of the policy makers in terms of emissions, the higher is the Brent target and the higher is the buffer against Brent shocks.

Key words:

Gasoline taxation, Adjustable carbon tax, Dynamic efficiency, Vehicle choice, Fuel efficiency

Biographical note

Valeria di Cosmo is a senior researcher in applied economics at the Department of Economics and Statistics "Cognetti de Martiis". She joined the Economic and Social Research Institute in Dublin in 2010, and worked there as an energy economist for 6 years. Between 2016 and 2018 she joined FEEM in Milan as a Marie Curie Fellow. She has several publications in the field of regulation of public utilities, both analysing the water and the energy sector. In particular her work as an energy economist focuses on the impact of renewables in the electric system and market design, with a special attention on the role of transmission lines across Europe.

26 – IMPACT OF PERFORM-ACHIEVE-TRADE POLICY ON THE ENERGY INTENSITY OF CEMENT AND IRON AND STEEL INDUSTRIES IN INDIA

Kaumudi Misra

Perform-Achieve-Trade (PAT) is a cap and trade policy initiative by the Indian government which encourages the energy intensive firms in reducing their specific energy consumption (SEC). The firms that fall under the policy are termed designated consumers (DC) and those that do not are non-designated consumers (NDC). Individual targets had been set for the firms under the policy, the firms that achieved the target are issued with energy saving certificates that are tradable with the ones that fail to comply. The current paper attempts to evaluate the impact of PAT policy (in its first cycle: 2012-2015) on the cement and iron and steel industries in India, using PROWESS database for a period of nine years: 2007-2015. The data has been treated for inflation. A descriptive analysis has been done separately for the two industries. Three -way tables has been used for the analysis, attempting to see the variables' performance categorised into DCs and NDCs in both the time periods – pre and post policy initiative. The descriptive analysis finds that the cement industry is energy intensive whereas the iron and steel industry is more raw material and capital intensive. The paper uses panel data for an in-depth analysis. The difference-in-difference methodology is adopted for the analysis and the random effect two way error component model is used to analyse the impact of PAT policy on the industries. The study reveals that in the case of cement industry the PAT policy is effective and helps the industry in transitioning to energy efficiency. The policy is found to be insignificant in the case of the iron and steel industry, the likely reasons being:

- No significant difference in the energy intensity of the DCs and NDCs in PAT years.
- Iron and steel industry is raw material and capital intensive whereas the PAT policy targets energy intensive industries.

Key words:

Perform-Achieve-Trade (PAT), specific energy consumption (SEC), energy intensity, panel regression, difference-in-difference

Biographical note

Kaumudi Misra has completed her Masters in Economics from Avinashilingam University, Coimbatore, in 2014 and is currently a full time PhD scholar in the Centre of Economics Studies and Policy, at the Institute for Social and Economic Change, Bangalore. Her research area is a combination of Environmental and Industrial Economics. The title of her thesis is 'Economics of low carbon economy in the power and manufacturing industries in India'. The research attempts to understand the efforts made by the energy intensive firms in transitioning to energy efficiency. Her work attempts to understand the impact of PAT policy on the cement, iron and steel and thermal industry. The thesis comprises of four objectives, of which two has been completed and have been presented in both national and international conferences.

27 – PRODUCTION CAPACITY TRADING IN CHINA’S COAL INDUSTRY: MARKET BASED INSTRUMENT AND ENERGY STRUCTURE ADJUSTMENT

Xiaoping Zhang

China’s energy mix relies heavily on coal, which is carbon-intensive and highly polluting. In order to adjust the energy structure, also adapt to a declining macro-economy, China decide to reduce “backward” coal production capacity of 800 million ton per year during the 13th five-year-plan. This is not the first time that China cut production capacity in coal industry. Historically, this object was achieved by command-and-control via a top-down channel from central government to local government, which was inefficient and confronted with many difficulties. During the current wave of production capacity reduction, China create a new market-based regime to channel the process, a production capacity trading system or production capacity replacement system. In 2006, China began to check and ratify the production capacity of every coal mine, which is quite similar to the cap system under an emission trading system. By allowing the transaction of production capacity, a cap-and-trade system is established to reduce backward production capacity. The idea is: firstly, within 2016-2018, China will cease to approve production capacity to new coal mines in principle. Secondly, by economic indicators and environmental indicators, production capacity is cataloged as advanced capacity and backward one. Thirdly, for the new coal mines, they are required to buy a proportionate quantity of production capacity quotas from those phasing-out coal mines with backward production capacity. Different ratio set by the State Council can be used to imply multiple policy objectives, including reduction of production capacity. Fourthly, the payment to coal mines with backward production capacity can be used to help the unemployed workers. In the last 3 years, the production capacity trading system operates properly, achieving the reduction while decreasing the possible friction and chaos. This regime, inspired by emission trading system, marks an important change that a market-based instrument can facilitate the energy transition and environmental governance in a more efficient way, and share the cost of transition between government and industry in a more reasonable manner.

Key words:

Market based instruments, cap-and-trade, energy transition, production capacity management, industrial policy

Biographical Note

Xiaoping Zhang is an associate of law at the Central University of Finance and Economics. He is the council member of Chinese Energy Law Society and Law Subcommittee of Chinese Hydraulic Engineering Society. He has published books and articles on environmental law and energy law.

28 – SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL GOODS AND SERVICES INDUSTRY: EXPLORING LINKAGES

Rajiv V. Shah and Samapti Guha

Economic progress has traditionally been viewed as having an inverse relationship with environmental protection and growth. Sustainable development tries to marry the diverse concepts of environmental growth and economic progress and add the dimension of social welfare to the mix. This idea is conceptualized through the definitions of Sustainable Growth as laid down in the Bruntland Report and by the OECD. Further, the UN has laid down 17 Sustainable Development Goals to be achieved by the year 2030. The Environmental Goods and Services (EGS) industry, by its very nature, encompasses the three pillars of sustainable growth and provides a natural and organic path to achieving the desired goals. This study attempts to lay out the basic structures of these two concepts (Sustainable Growth and EGS Industry) and tries to highlight the points of intersection which can help map the areas of common interest and create synergies in achieving the common goals.

The broad understanding is that the EGS industry can play a significant role in the achievement of Sustainable Development as envisioned by various international agencies. The major reasons for this linkage not being realized are lack of awareness among people and governments, lack of identification of the EGS industry as one that creates positive externalities and hence should be regulated as such, and trade barriers that inhibit the free flow of environmentally beneficial technology among nations.

Key words:

Sustainable Growth, Environmental Goods and Services Industry, Eco-industries, triple bottom line, pollution.

Biographical note

Rajiv V. Shah is a Professor at T. A. Pai Management Institute, Manipal in India. His teaching interests are in Management Accounting and Control, Taxation, and Mergers & Acquisitions. Prior to joining academics, he has worked in the field of tax administration and his research interests lie in the areas of Direct Taxation, Environmental Taxation and the Environmental Goods and Services Industry.

He has done his PhD from the TISS, Mumbai in the area of Environmental Policy and Solid Waste Management firms. He has presented papers in international conferences, including past editions of GCET.

29 – ENVIRONMENTAL TAXATION IN AFRICA: BARRIERS AND POLICY OPTIONS

Elena Belletti

Countries in Africa are among the most severely impacted by the effects of climate change and local pollution, with poorest households being the most vulnerable to environmental issues. Additionally, their public revenues often do not meet the 15% tax-to-GDP ratio, which is considered the minimum threshold to support development; and high inequality among the population poses a significant challenge to sustainable development. While environmental taxation would ideally contribute to tackling both those socioeconomic and environmental issues, countries in Africa often lack the necessary fiscal infrastructure to implement market-based instruments for environmental fiscal policy, and frequently face significant issues in shaping expenditure policies that would effectively offset some of the regressive effects of those instruments. Within this context, what are the options for those countries in the area of environmental fiscal policy, which would support the implementation of the Sustainable Development Goals (SDGs)?

This paper provides an analysis of the current barriers faced by developing countries, least developed countries (LDCs) and other countries in special situations in Africa, both from the tax and from the public expenditure point of view, which pose challenges in the implementation of market-based instruments for environmental fiscal policy. Starting from this analysis, it then aims to provide a practical overview of which fiscal policy instruments could be practically implementable by those countries, while contributing to tackle some of the most prominent environmental issues in the continent; and which are the necessary conditions for those instruments to be successfully applied, while contributing to achieving the SDGs. The paper takes into consideration the potential for additional revenue mobilization through environmental taxation, the administrative feasibility of proposed options, and their effectiveness in tackling the most pressing environmental issues. It also analyses the suitability of those options against some of the social, economic and environmental objectives declared by those countries in national sustainable development strategies and in international agreements.

Key words:

Environmental taxation, Least developed countries, Africa, Market-based environmental policy instruments, Developing countries

Biographical note

Elena Belletti is an energy and environmental economist specialised in taxation issues. From 2015 to 2019, she worked as an Economic Affairs Officer at the United Nations Department of Economic and Social Affairs, providing advice to tax authorities of developing countries on domestic resource mobilization. She is a member of the United Nations Subcommittee of Experts on Environmental Taxation Issues, and is currently pursuing a Master of Public Administration (MPA) in Environmental Science and Policy at the School of International and Public Affairs, Columbia University. An economist by academic training and professional background, she previously worked for five years in the energy sector, first as a senior advisor for the trading branch of a major, and later as a senior economist for a consulting firm. Ms. Belletti holds an MSc in Economics and a Master's Degree in Energy and Environmental Economics.

30 – PROGRESS AND SOME OBSERVATIONS AFTER FIRST YEAR'S IMPLEMENTATION OF CHINA'S ENVIRONMENTAL PROTECTION TAX LAW

Wu Jian¹, Chen Qing¹ and Bill Butcher²

¹ School of Environment and Natural Resources, Renmin University of China,

² School of Taxation and Business Law, UNSW Sydney, Australia

The *Environmental Protection Tax Law of the People's Republic of China* (EPTL) has been in force since Jan 1st, 2018. In the ensuing period, what conclusions can be drawn on the impact of the new law and to what extent has it achieved its desired effects? Having completed a preliminary assessment of the law's first year the authors present some proposals for improving its implementation and some potential legislative amendments to enhance its effectiveness. (1) Total revenue from the tax was significantly less than expected. Three major factors can explain this disparity: major pollutant emission reductions nationwide; the preferential tax rate afforded to the thermal power industry due to its implementation of ultra-low emission standards; and some emissions escaping tax collection due to poor emission data verification. (2) Tax rate differentiation. As the EPTL allows provinces some freedom to set their own EPTL tax rates, the study used the coefficient of variation to measure tax rate disparity among provinces. It found that although the absolute variance of tax rate among provinces is increasing, the relative variance is getting smaller. (3) Firms' behaviour choices. A survey was conducted on firms' behaviour choice under current tax law. The results confirmed the authors' expectation that the low tax rate imposed under the EPTL was insufficient to affect pollution reduction behaviour. Surprisingly, aggressive mitigation actions due to Command & Control policies has already flattened the marginal cost disparity among firms, leaving less room for the incentive-based pollution tax to achieve efficiency improvement. (4) Uniform tax rates. The computable general equilibrium (CGE) model was applied to compare uniform and differentiated tax rates, and found that better cost-effectiveness could be achieved by differentiated tax for different industries. (5) Institutional conflicts. Conflicts between tax bureaux and environmental protection administrations compromise the EPTL's implementation. Duty-sharing/cooperation and policy collaboration between these administrations would improve implementation. (6) Design faults. The study revealed bugs in the EPTL's design, for example, for the taxation of volatile organic compounds and solid waste. These could be rectified by future legislative amendment.

Key words:

Environmental tax, Policy, China

Biographical note

WU Jian is Professor of Environmental Economics and Associate Dean at the School of Environment and Natural Resources of Renmin University of China. She is a board member of the East Asian Association of Environmental and Resource Economics (EAAERE). She specializes primarily in economic instruments for environmental and natural resources management, and institutional and economic analysis on environmental policy, and focuses on China's water, energy and nature conservation. She has published more than 80 articles and 4 books. Her assignments have included work with the Global Environment Facility (GEF), Asian Development Bank, the World Bank, CCICED, the Ministry of Ecology and Environment, the Ministry of Science and Technology, and the State Taxation Administration of China.

31 – PLASTICS TAX FOR A CIRCULAR ECONOMY

Dora Fazekas and Alistair Smith

Environmental taxes are one type of market based instrument which may be used to implement environmental policy priorities. These measures can raise fiscal revenues while furthering environmental goals.

The plastics sector is a manufacturing sector that receives most attention from a circular economy perspective, with regards to its recyclability and reusability, as well as the generation of waste and emissions. Plastics are associated with a throw-away society and high levels of waste, especially when it comes to single-use plastics and packaging. In January 2018, the European Commission adopted the Strategy for Plastics in the Circular Economy, which outlines the EU's future policy priorities for the plastics sector: plastic ban for certain products, consumption reduction targets, collection targets, labelling requirements and awareness-raising measures. A European wide plastic tax has been suggested to increase the uptake of recycled material in the plastics sector, in January 2018, by Budget Commissioner Günther Oettinger. In March 2019, the European Parliament approved a law banning a wide-range of single-use plastic items by 2021.

In a recent Cambridge Econometrics analysis for DG Environment, we have done a cross-cutting analysis of policy pathways to reduce environmental impacts of production and use in five key sectors. Plastics was one of the sectors and circular economy was one of the pathways to increase the amount of recycling and reuse of products within the economy, and reduce virgin material consumption, thereby reducing environmental impacts.

In modelling a plastic tax designed to reduce use of plastics we have found that while environmental benefits may be substantial, economic costs of such a measure are minimal. Scenarios result in very similar effects: contraction in the plastics sector, significant tax revenue, and a small net positive impact on GDP and employment. As always, there are caveats to the modelling, such as to achieve the modelled circular economy progress, increased capacity in EU waste management and recycling are required.

Key words:

Circular economy, Plastic tax, Cost of taxation, Environmental impacts, Co-benefits

Biographical note

Dr Dora Fazekas heads up Cambridge Econometrics' Budapest office. She specialises in the application of economic and econometric analysis to inform policy-makers in the fields of climate, energy and the circular economy. Dora manages CE's contributions to official European policy impact assessments, environmental and socio-economic evaluations, and consultancy projects for international organisations and national governments. She has fifteen years' experience successfully bridging academic research with policy-making and technology R&D. Dora speaks five languages, and has been a speaker and panellist at various academic and policy events.

32 – REUSE AND CIRCULAR ECONOMY: IN SEARCH OF A LEGAL FRAMEWORK. THE ITALIAN TAX PERSPECTIVE

Marina Bisogno

The way we handle wastes has negative effects on the environment, climate, human health and economy. For that reason European Union launched an ambitious package on circular economy to stimulate the reduction of waste and the virtuosity of the cycle. The current international framework wants to reverse the tendency "produce, use, throw away" in favor of an eco-friendly 'mantra' "reduce, reuse and recycle". The 3 R's rule implies different concepts that are often confused. Reuse prevents the creation of waste, using the same item or natural resource, while recycling alludes to the transformation of waste item to a useful one. Although reuse implies a higher level of environmental protection than recycling, it has not an adequate regulation in Italy. Due to the lack of a stable legal framework, some Italian companies moved their activities to other countries. Only in September 2018 a draft law n. 1065 tried to introduce a regulation for the economy of second-hand goods and the promotion of the sector of reuse in Italy, as well as the establishment of a permanent working table on reuse. Starting from the Italian perspective this paper wants to reflect on reuse policies. To increase the practice of reuse it is necessary to establish a concrete legislative support, beyond legal definitions stand in Directive 2008/98/EC. Moreover, to stimulate its potential, reuse must be made more economically competitive through tax incentives in accordance with a promotional tax dimension. In fact, fiscal measures have always met extra fiscal functions, particularly in environmental issues, in which tax policies can incentive or disincentive harmful or eco-friendly behaviours. This paper aims at assessing if reuse justifies a privilege tax regime compared to recycling and how it could be adopted, and encouraged.

Key words:

Waste management, Reuse, Recycling, Tax incentives, Circular economy

Biographical note

Marina Bisogno possesses a Double Degree Ph.D. in Law with Doctor Europaeus certificate University of Naples Federico II and University of Paris 1 Panthéon-Sorbonne and fully qualified lawyer. The title of her doctoral thesis is "Environmental taxation: a legal comparative analysis". She applies a broader approach to the concept of environmental taxation, analysing environmental taxes and tax expenditures, to assess their compatibility with national and European tax law principle. Principal investigator of some research projects on environmental matter and author of various publications in the area of taxation.

33 – PLASTIC OCEANS: ENVIRONMENTAL PUBLIC POLICIES, TAX BENEFITS AND THE BRAZILIAN ENVIRONMENTAL AGENDA

Weber Busgaib Gonçalves, Renan Cavalcante Araújo, Pedro Felipe de Oliveira Rocha

According to researches carried out by the World Bank, compiled by the World Wide Fund for Nature (WWF), the world has produced more plastics over the past 20 years than all the years of history added. This is extremely worrying, since the plastic waste will eventually become a solid residue that requires management. However, researches shows that 80 percent of the waste found in the oceans is originated from land-based activities.

The data demonstrates that Brazil is one of the five largest plastic waste producers in the world, with more than 11.3 million tons per year, while, at the same time, has extremely low recycling rates (around 1.28 %), which shows that the country contributes heavily to the aggravation of the plastic waste problem. In this context, many initiatives are being adopted in Brazil in order to reduce the impact of the waste on the environment. This paper analyses the new measures being adopted by the federal government such as the National Agenda for Urban Environmental Quality, which established targets for the decontamination of the seas. So, the Federal Government voluntarily adhered to the Oceans Agreement, foreseen in the Sustainable Development objective n. 14 of the UN. Thus, the decontamination of the oceans has become a priority in Brazilian public environmental policies.

Analysing local policies, one of the most innovative highlights is the Zero Plastic Decree, signed by the Administration of the Island of Fernando de Noronha, in Pernambuco, Northeast of Brazil, in December 2018 and which comes into force in April 2019. By this Decree, the island will no longer accept any kinds of plastic containers, packaging, straws, cutlery and plastic bags. In order to prioritize public policies aimed at preserving the environment, Brazilian municipalities located on the coast may benefit from the tax revenue sharing arising from the collection of ICMS (VAT) which are destined, in several Brazilian states, to those cities that have the waste management in their political agenda. So, Brazil can use taxation and revenue sharing as an incentive for decontamination of the seas, preserving its biodiversity of marine fauna and flora for future generations.

Key words:

Plastic waste, VAT, Brazilian agenda

Biographical note

Weber Busgaib Gonçalves: Attending Masters Degree in Law at Federal University of Ceará (UFC). MBA focused in Taxation from Getúlio Vargas Foundation-FGV/RJ. Specialization in ICMS from College CDL/CE. Bachelor of Law degree from the Federal University of Ceará (UFC). Partner of the Rocha, Araújo e Arrais Law Firm.

Renan Cavalcante Araújo: Specialization in Business Management from Dom Cabral Foundation/MG. MBA focused in Taxation from Getúlio Vargas Foundation-FGV/RJ. Specialization in ICMS from College CDL/CE. Bachelor of Law degree from the Federal University of Ceará (UFC). Tax coordinator at BBMA Law Firm.

Pedro Felipe de Oliveira Rocha: Attending Masters Degree in Law at Pontifícia Universidade Católica de São Paulo (PUC-SP). MBA focused in Taxation from Getúlio Vargas Foundation-FGV/RJ. Specialization in ICMS from College CDL/CE. Bachelor of Law degree from the Federal University of Ceará (UFC). Attorney-at-law, São Paulo/SP-Brazil.

34 – TARGETING PLASTIC POLLUTION WITH TAXES

Roberta Mann

Marine plastic pollution is a matter of increasing global concern. In 2015, a report by McKinsey & Company stated that “the amount of unmanaged plastic waste entering the ocean has reached crisis levels.” Assuming a constant level of fish stocks, the weight of plastic pollution in the ocean in 2050 is projected to exceed the weight of the fish. The concern reaches all levels of government from the local to the national. Solutions include plastic bag bans, taxes or fees on single-use plastics, incentives for reusable bags, and incentives for recycling. Recycling has become a particular issue since early 2018, when China announced it would stop accepting imported plastic waste. Plastics pollution creates significant environmental externalities, such as harm to natural systems, greenhouse gas emissions from production and after-use incineration, and human health impacts from endocrine disruptors released when plastics degrade. Environmental taxation should be an efficient solution to the plastics pollution problem, if properly designed. Research shows that taxation could be more effective than other measures such as incentives. This paper will assess the various solutions proposed and used worldwide.

Key words:

Waste management, Water policies, Behavioural issues, Biodiversity and nature protection, Environmentally harmful subsidies

Biographical note

Roberta Mann is the Mr. & Mrs. L.L. Stewart Professor of Business Law at the University of Oregon School of Law, where she teaches courses on income tax, business entity tax, international tax, and tax policy. A cum laude graduate of the Arizona State University College of Law, Mann received her LLM in Taxation from Georgetown University Law Center with distinction. Her scholarship focuses on sustainability and energy topics ranging from carbon taxes to the water-energy nexus. She served as the only tax lawyer on a National Academy of Sciences study panel on the greenhouse gas impact of the Internal Revenue Code. Before beginning her teaching career, Mann served on the staff of the Joint Committee on Taxation and was a senior attorney at the Office of Chief Counsel, Internal Revenue Service. She is a member of the American College of Tax Counsel.

35 – THE LONG JOURNEY TO FAIR TAXATION OF AVIATION

Linnea Westman

During the period 1 March 1989 – 31 December 1996, Sweden levied an environmental tax on domestic flights. The tax was based on data on fuel consumption and emissions of hydrocarbons, nitric oxide and carbon dioxide during an average flight by the type of aircraft used. The European Court of Justice stated in the judgement Braathens, C-346/97, that the tax was in fact a tax on fuel consumption and as such incompatible with the harmonised tax system introduced by Directive 92/12 on the harmonisation of the structures of excise duties on mineral oils.

During 2006, the Swedish Parliament decided to introduce a tax on air travel. Flights to and from certain parts of Sweden were exempted from tax, which is why there was a need for a state aid approval from the European Commission. Before such approval was obtained, the newly elected Swedish Parliament decided not to go ahead with the tax on air travel.

The current Swedish tax on air travel was introduced and put into effect in 2018. The tax is designed as a tax on commercial flights and is paid for passengers travelling from a Swedish airport. The airline that carries out the flight is liable to tax. Various levels of tax are levied based on the final destination of the passenger (for 2019: SEK 61, 255 or 408, roughly equivalent to 6, 25 and 40 euros).

In the autumn of 2018, the Parliament decided a resolution on abolishing the tax on air travel, but that decision was de facto later reverted in January 2019 when four of the parties in Parliament reached a political agreement so a Government could be formed. The agreement, called the January Agreement, forms the basis for the on-going work of the Government and explicitly states that the tax on air travel is to be retained.

At the meeting of EU Finance Ministers in January 2019, the Netherlands presented a paper on carbon pricing and aviation tax. The Netherlands is holding a conference on this topic in June 2019.

We think that a way to address the aviation sector's climate impact is to levy a tax on air travel until taxation of aviation fuel is possible. Can a way forward be bilateral agreements between willing countries? There are many unresolved questions when it comes to this but perhaps the time has come to start discussing the issue.

Key words:

Tax, Aviation, Climate, Bilateral agreement

Biographical note

Linnea Westman received her LL.M. from the University of Uppsala in 2007 and joined a Swedish law firm to work with taxation matters as a legal associate. She entered her career as a judge within the Swedish court system in 2008 (final step Associate Judge at the Administrative Court of Appeal in Stockholm) before joining the Swedish Ministry of Finance in 2016. She serves as a legal adviser at the Tax and Customs Department and has been closely involved in the legislative and political process regarding the Swedish tax on air travel, notably drafting all relevant legal bills regarding this tax. She advises the Finance Minister on aviation tax policy issues and writes speeches and other policy instruments. She has lately been involved in shaping Swedish international aviation tax policy to address the climate impact of aviation.

36 – DIGITAL DATA SHARING FOR REDUCED EMISSIONS IN PORT VISITS

Andreas Chrysostomou¹ and Mikael Lind²

¹ MarineFields Holding Ltd, Cyprus, ² Research Institutes of Sweden (RISE), Sweden

The performance of port visits of today causes unnecessary emissions. Since today's fleet and port infrastructures is under-utilized there are still incentives for shipping companies and ports to take actions for reducing the carbon footprint from transporting goods and passengers at sea. Ports and ships are still not totally 'in-sync' resulting in unnecessary waiting times and/or unnecessary movements.

As of today, it is common that when ships visiting ports are not served 'Just-In-Time', ships must wait until port resources are available. If ships and ports would be more synchronized that would mean that the ship could steam in a more optimal way, requiring less energy and in effect reducing its carbon foot-print. Achieving 'Just-In-Time' in ports, requires a collaboration environment engaging those that are involved in sea transports. The digital legacy in today's ports has been strongly influenced from that, each port has developed digital capabilities in isolation, resulting in sub-optimized operations.

Planning and communicating about intended actions and progress for all involved actors, throughout the ecosystem of sea transports berth-to-berth is the key to solve this. Empowered by digitization, sub-optimized behaviour is about to become history. International initiatives to harmonized collaboration and data sharing has now been taken through Port Collaborative Decision Making (PortCDM) (www.ipcdmc.org) allowing involved actors (ports with its actors, shipping companies with its ship operator, ship agents, and ships, as well as hinterland operators) to instantly share data in internationally agreed ways allowing for the emergence of common situational awareness.

The paper uses MarineFields, who provides a data sharing platform, building upon these principles, that allows anyone to connect and share data about plans and outcomes of port call operations, as empirical foundation. Among other things, this platform allows the continuous growth of knowledge associated to optimize port call operations as the outline of the port call evolves through the involved actors sharing data with each other.

In conclusion, the paper will explore how enhanced collaboration and data sharing among port call actors and with the visiting ships, hinterland operators, and upstream ports allows for enhanced efficiency providing reduced CO₂ emissions eliminating the need of market-based measures to regulate the emissions by introducing the concept of collaboration instead. This would mean that market-based measures to regulate CO₂ emissions from international shipping might not be necessary to introduce. Changes associated to establish competitive advantage and responding to demands for profitability will drive the optimization of the utilization of used resources.

Key words:

Digitization, Collaboration, Ecosystem, Maritime transports, International Harmonization

Biographical note

Mikael Lind is Associate Professor and Senior Strategic Research Advisor with Research Institutes of Sweden (RISE) and has initiated and heads a substantial part of several open innovation initiatives related to ICT for sustainable transports of people and goods including Sea Traffic Management and Port Collaborative Decision Making (PortCDM). Lind is also the co-founder of Maritime Informatics and has a part-time employment at Chalmers University of Technology, Sweden.

37 – VAT ON PASSENGER TRAVEL BY AIR AND BY TRAIN IN THE EU

Julia Tumpel

The transport sector accounts for about a fifth of all CO₂ emissions. Most emissions derive from road transport (17 %), while aviation contributes to about 3 % of CO₂ emissions. However, due to aeroplanes emitting greenhouse gases in high altitudes, the effect aviation has on climate change is proportionally larger than its share on emissions. The need for reductions of greenhouse gas emissions in the transport sector – road transport and aviation – is apparent.

A flight from Vienna to Munich takes about one hour – the total time for the journey from city centre to city centre adds up to three hours. The fastest train between the city centres takes about four hours. Travelling by car takes about four and a half hours. The difference in CO₂ emissions is enormous: about 8 kg for train travel, 50 kg for using a car and 131 kg for travelling by plane.

It is important to encourage travelling by train; air-travel should be avoided. One puzzle piece mitigating the effects of climate change are taxes. There are different possibilities for achieving these goals through taxation: fuel tax, carbon tax, seat tax etc

However, possibly no new taxes would have to be introduced. Passenger travel by air is currently treated favourably in most EU member states compared to passenger travel by train. Aviation is currently exempted from VAT while airlines are able to deduct input VAT. This is true in most member states for international and national aviation, while passenger travel by train is widely taxed, albeit generally at a reduced rate.

This paper looks at the possibility of boosting train travel and reducing traveling by plane via a change of national VAT regulations, while still complying with the provisions given by the VAT directive.

Key words:

VAT, Passenger Travel, CO₂ Emissions, Exemptions, VAT directive

Biographical note

Julia Tumpel studied law at the University of Vienna as well as the University of Western Australia and did an internship among others at the Austrian Embassy Commercial Section in London. Since January 2018, she is a PhD candidate and works as a teaching and research assistant at the Department of Financial Law at the University of Vienna. Additionally, she studies “Tax Law and Accounting” – an LL.M. program - at the University of Vienna. Her main fields of research include VAT and Environmental Taxation.

38 – PRICE SUPPORT SCHEMES IN THE SERVICE OF THE EU'S LOW-CARBON ENERGY TRANSITION

Theodoros Iliopoulos

This submission focuses on the European Union's low-carbon energy transition as served by the new Renewable Energy Directive, and examines to which extent and under what conditions Member States can employ price support schemes for the promotion of renewable energy sources, namely feed-in tariffs, feed-in premiums or net metering. Most Member States prefer to use price over quantity support schemes, like tradeable certificates; still, the Commission has always been sceptical about such instruments, which have been regarded as non-sustainable, market-distorting and trade-restricting.

The new Renewable Energy Directive for the first time introduced rules specifically for support schemes. According to Article 4, support schemes shall be “market-based” and “market-responsive” and shall avoid unnecessary distortions. Since these terms are not defined in the law, it is questioned what their exact content is. In addition, it is not clear whether these criteria only introduce requirements for how support schemes should operate in practice or they also determine the selection of the support schemes. This latter scenario entails that Member States will have to prove that the price support schemes they possibly want to enact best fits the market conditions. The Directive goes further to state that price support schemes should have the form of a premium and be granted after tendering procedures. Nevertheless, there are no similar requirements regarding quantity instruments. It is thus examined whether quantity instruments are de facto in line with EU law. This would constitute a strong nudge to Member States for resorting to quantity instruments.

It should be also noted that the new Energy Governance Regulation has now granted the Commission certain monitoring, assessing and intervening powers over national energy policies. This means that the Commission might have the power to pressure Member States to only adopt price support schemes of specific qualities.

This submission argues that the new Directive implicitly favours quantity instruments. Yet, the legal landscape is obfuscated and does not provide clear rules for the choice of support schemes. Consequently, Member States can be coerced to abandon price instruments if EU law is interpreted as granting extensive powers to the Commission and, then, if the Commission makes use of such powers. Both conditions are questionable, both from a legal and a practicable point of view.

Key words:

Price support schemes, Renewable Energy Directive, Market-based support schemes, Low-carbon energy transition

Biographical note

Theodoros Iliopoulos has studied law at National and Kapodistrian University of Athens (LLB degree in 2014). He has an LLM in “EU Law” from National and Kapodistrian University of Athens (2015) and an LLM in “Law and Economics” from Utrecht University (“cum laude”, 2016). He has worked as a lawyer and as a university teaching assistant. Since September 2017, he has been a doctoral researcher in energy and environmental law at Hasselt University. His research focuses on energy and environmental law. More specifically, his research examines what the legal framework for the promotion of renewable energy sources is in the European Union and how it should develop.

39 – THE USE OF ENVIRONMENTAL TAXATION AS A CATALYST FOR THE USE OF SOLAR ENERGY TO REDUCE CARBON EMISSIONS IN BRAZIL

Amsterdan Ferreira Rebouças, Sofia Laprovitera Rocha

When it comes to taxation, it is usual to think of the high tax burden in the country, which ends up referring to the problems of income distribution and preservation of the environment. If we focus this taxation to the energetic slope, we have, even more accentuated, the tax incidence from its production to the consumption. Component environmental taxation concerns have been taking into account the increasing over the years exponentially the increase in ecological disasters that threaten the quality of human life. Environmental aggression should be avoided or reduced and, for this, it is necessary to adopt mechanisms that the government seeks for less aggressive alternatives to protect the environment. Therefore, it is important to refer to the idea of externalities addressed by Pigou whose negative results are borne by the whole community and not only by those who have generated them or have benefited in some way by internalizing the social and environmental costs. This fact is not reflected in the market cost, specifically in the Brazilian case, where taxation is already quite high, and ends up hampering the acceptance and introduction of public policies aimed at reducing environmental damage, since it is concern not to increase even more the tax burden borne by the distribution companies and the final consumers. Thus, the introduction of tax mechanisms faces two major problems. The first is the adoption of a new tax that could end up burdening the production chain even more in energy production. On the other hand, by exempting a certain type of energy production, such exemption is not passed the cost on the final consumer, losing itself in the middle of the production chain. In addition to these obstacles, the lack of governmental will is worrying. The legislature, in each of the Brazilian government spheres, shows no interest in creating incentives (positive or negative), nor do executive powers strive to implement new technologies without some financial consideration for their administrations. In this sense, this work aims to establish an overview of the Brazilian situation with emphasis on its difficulties for the implementation of public policies aimed at the reduction of carbon emission through the production of renewable energy based on the solar energy matrix.

Key words:

Environment Taxation, Carbon Emission, Solar Energy

Biographical note

Sofia Laprovitera Rocha graduated in Social Communication from the University of Fortaleza (2009) and graduated in Law from Faculdade Farias Brito (2015). She obtained a postgraduate degree in Civil Procedural Law by Faculdade Damásio and a Master's degree in Law from the Universidade Federal do Ceará (UFC). Partner of the Rocha Law Firm and Cheif General Corregedoria of Fortaleza County

40 – AN INNOVATIVE USE OF THE TAX COLLECTION SYSTEM TO PROMOTE ENERGY EFFICIENCY IN BUILDINGS

M. Luisa Esteve

Property Assessed Clean Energy (PACE) is a tool to obtain low-cost, long-term financing for energy efficiency, renewable energy, and water conservation upgrades to homes and buildings. PACE financing is repaid as a special assessment added to a property tax bill.

The PACE concept was designed in California in 2008 to overcome one of the most significant barriers to costly energy efficiency retrofits: up-front costs. The PACE loans are paid by additional assessments on the property owner's property taxes over an agreed upon term while energy costs are simultaneously lower. This allows property owners to begin saving on energy costs while they are paying for energy efficient upgrades. One of the most notable characteristics of PACE programs is that the loan is attached to the property rather than the individual, so the consumer can sell the property leaving the debt to be paid through the property tax assessed on the subsequent owners.

PACE programs benefit not only property owners but also cities and countries: PACE can play an important role in reducing local greenhouse gas emissions, promoting energy efficiency improvements in its buildings, making the shift to renewable sources of energy more affordable, and reducing energy costs for residents and businesses.

The aim of this paper is to analyse existing experiences in the PACE concept and to examine, from a legal point of view, which measures and legal reforms would be required to transfer this model to the Spanish legal system.

Key words:

Taxes, energy efficiency, buildings, renewable energy, environment

Biographical note

Dra. M. Luisa Esteve: Senior Lecturer of Tax Law at the Universitat de Girona. Main research interests are local financing system, public-private partnerships and financing of public services. Coauthor of the chapter: Helena Villarejo Galende, María Luisa Esteve Pardo and Clara Peiret García, (2019) "Smart Cities: Can Business Improvement Districts Reduce the Environmental Footprint of Urban Areas?", in Marta Villar Ezcurra, Janet E. Milne, Hope Ashiabor, Mikael Skou Andersen, *Environmental Fiscal Challenges for Cities and Transport. Critical Issues in Environmental Taxation series*, Edward Elgar Publishing.

41 – TAX INCENTIVES FOR PHOTOVOLTAIC POWER SELF-CONSUMPTION: AN ANALYSIS OF THE SPANISH EXPERIENCE

Marta Villar Ezcurra and Carmen Cámara Barroso

Spain has been one of the pioneering countries in developing the photovoltaic power generation. Since its initial launch, there has been substantial involvement of public incentives in three different ways: tax incentives, direct subsidies and regulated prices for the power generated by photovoltaic investments. Due to the involvement of public promotion in developing photovoltaic power production, there has been a debate on the best way to make the increase of the photovoltaic production power compatible with the desirable neutrality of public activity (aside from the necessary promotion of the environmental needs).

In this regard, the treatment of self-consumption is a key issue for the faster increase in photovoltaic facilities. The final electricity market shape depends on how self-consumption is treated from a fiscal point of view, as well as for regulated matters including the possibility of selling electricity to third parties through networks at a given price.

Some are of the opinion that tax incentives for self-consumption must be avoided while others believe that faster development and production of photovoltaic technologies require strong support from public institutions.

Key words:

Photovoltaic, Self-consumption, Tax incentives, Renewable energy, Spain.

Biographical note

Marta Villar is full professor of Tax Law at CEU San Pablo University and a practicing lawyer in European and tax law in Madrid. She has published and lectured extensively on a broad range of topics, including environmental and energy taxes. She holds a PhD degree (*Cum laude*) from the University Complutense of Madrid and a Master's Degree in European Law from the *Université Libre de Bruxelles*. Her professional experience includes being an attorney advisor in the Spanish firm J&A Garrigues as well as a legal advisor to the EU for tax law matter over the last 30 years. She is also a member of the EC of IFA and the EATLP and was an external consultant for the European Commission (TAXUD). Prof. Villar has led many research projects and enjoyed several research stays at different international universities. She was the Conference Chair of the 19th GCET.

Carmen Cámara's PhD thesis was defended at the University of Jaén in 2013. During these years, she combined her teaching assignments with her research tasks. A few years later, in 2016, she completed a Master's degree in Tax Consultancy at the Centro de Estudios Financieros. Currently, she performs these tasks at the Madrid Open University. Her research has an international nature that was reinforced by research stays at the *Scuola Europea di Alti Studi Tributari* (Bologna) and the *International Bureau of Fiscal Documentation* (Amsterdam). Throughout these years she has published numerous articles in indexed journals with a high impact index, and has participated in several national and international conferences and workshops. She won the Young Research Award of the 19th GCET.

42 – ENVIRONMENTAL TAX REFORM: A POLICY TOOL APPLICABLE FOR THE NEXT DECADES?

Stefan Speck

Environmental tax reform (ETR) is the policy tool for reforming the taxation scheme by increasing the tax take of environmental taxes and simultaneously reducing labour taxes in a revenue-neutral way is promoted by international organisation, such as OECD, World Bank and IMF, and implemented in countries throughout the world since the 1990s. The rationale behind is to boost employment and economic growth by reducing environmental pressure. Up to now, revenues from energy and carbon taxation schemes have been the main component of any ETR implemented and the topic of tax base erosion was not really discussed. However, more stringent policy targets in the energy and climate field (the 2015 Paris Agreement, the 2018 EC's Long-Term Strategy on GHG Emissions etc.) will be a game changer in the medium-to long-term as dramatic reduction of the use of fossil energy sources is required for achieving these targets. In addition, bans on sales of vehicles with internal combustion engines and the increase in electric vehicles will be another policy process limiting the consumption of transport fuels, which are generating the largest environmental tax revenues and are vital for any ETRs under the current fiscal system.

The paper studies the ex-post development and future trends in environmental tax revenues as well as potential implications of the demographic and technological changes as key drivers for future economic developments. Past developments reveal that environmental tax revenues are rather stagnant in EU Member States during the last decade and it can be assumed – based on the overall political environment – that this trend will not necessarily reverse. Changes in population in Europe may further dampen the hope of the introduction of far-reaching ETRs as a shrinking in the labour force is projected in several EU Member States and associated with this development a shrinking of the labour tax base must be suspected. In addition, an increase in old-age related expenditure is projected making it even more important to find new tax bases for covering these extra spending. The implications of technological change on national budgets are far from clear but can also limit the application of ETRs in the long-term.

Key words:

Energy/carbon taxation, Environmental tax reform, Demographic and technological change

Biographical note:

Stefan Speck is working at the European Environment Agency (EEA) in Copenhagen. He holds a PhD in economics from Keele University in England. His work at the EEA is on the application of market-based instruments for environmental policy, environmental fiscal reform and the green economy. He was part of the research team of the EU-funded project 'Competitiveness Effects of Environmental Tax Reforms' (COMETR) and contributed to the research project 'Resource Productivity, Environmental Tax Reform and Sustainable Growth in Europe' (PETRE) funded by the Anglo-German Foundation. He published widely on environmental fiscal reform and green economy; he was co-editor of the books *Environmental Fiscal Mechanism and Reform for Low Carbon Development: East Asia and Europe* (2013) and *Environmental Tax Reform: A Policy for Green Growth* (2011) and was responsible for the EEA reports *Towards a green economy in Europe EU environmental policy targets and objectives 2010-2050* (2013), *Resource-efficient green economy and EU policies* (2014) and *Environmental taxation and EU environmental policies* (2016).

43 – ANALYSIS ON THE IMPLEMENTATION OF ENVIRONMENTAL PROTECTION TAX AND SUGGESTIONS FOR ITS IMPROVEMENT

Ping GAO

As an important tax reform measure to implement the construction of "Ecological Civilization" in China, Environmental Protection Tax was officially implemented on January 1, 2018. How to implement it, what problems have emerged, and how to improve it in the next step need to be observed and studied.

The paper of "Analysis on the Implementation of Environmental Protection Tax and Suggestions for its Improvement" will be divided into four parts as following:

First, the paper will analyze main characteristics of Chinese Environmental Protection Tax, including its comprehensiveness, taxing on direct emissions and levied by cooperating between tax bureau and environmental protection agency, etc.

Second, the paper will analyze the basic situation of implementation of Environmental Protection Tax, including the application of tax rates in different areas, the application of collection methods, etc.

Third, the paper will study the main problems emerged in the implementation of Environmental Protection Tax, including the main problems existing in the collection and management, the scope of tax collection, and the problems existing in the tax-free mode of sewage treatment plants.

Fourth, in view of the main problems in the implementation of Environmental Protection Tax, this paper will put forward some suggestions on the revision of environmental protection tax law in future.

Key words:

Environmental Protection Tax, Characteristics, situation of implementation, Problems in the implementation, Suggestions on the revision of law

Biographical note

GAO Ping, graduated from Central University of Finance and Economics in 1988, majoring in taxation, visiting scholar at the University of Copenhagen Law School in 2004, and visiting scholar at Victoria University in Australia in 2006. She received Ph.D. in Economics from Central University of Finance and Economics in 2009. She is currently a professor at the School of Finance and Taxation of the Central University of Finance and Economics, director of the tax department, certified public accountant, and certified tax agent. She lectured on tax law courses, focusing research on environmental taxation policies and participating in environmental protection tax legislation in China. She also has published monographs and papers on environmental taxation in China.

44 – AUSTRALIAN CARBON POLICY: TWO STEPS FORWARD, ONE STEP BACKWARDS?

Evgeny Guglyuvatyy and Natalie Stoianoff

Australian climate policy has a relatively long and uneven history. Australia joined the United Nations Framework Convention on Climate Change and signed the Kyoto Protocol enthusiastically supporting greenhouse gas (GHG) reduction. A range of measures aimed to reduce Australia's GHG emissions have been on the agenda at both the Federal and State level. Some of these measures were successfully implemented, some were introduced and then repealed and some never reached the implementation stage. This article examines the current Australian climate change regime including the Direct Action Plan, Emissions Reduction Fund and National Greenhouse and Energy Reporting policy. The current Australian policy is examined with reference to the repealed carbon pricing scheme to assess the most significant aspects of the current regime. The comparative perspective is necessary to identify effectiveness or otherwise of the Australian policy in GHG mitigation. Such critical examination of the Australian regime allows us to trace progression of the GHG mitigation efforts specifically in the light of the Paris agreement signed by Australia. This paper illustrates that the development of climate law in Australia involved some innovative and responsive law initiatives. However, the current state of Australian climate policy can only be described as regressive in nature rather than providing progression towards climate change mitigation.

Key words:

Australia, climate change policy, GHG.

Biographical note

Dr. Evgeny Guglyuvatyy is a Senior Lecturer in the School of Law and Justice at the Southern Cross University.

Natalie Stoianoff is a Professor in the Faculty of Law at the University of Technology, Sydney, and the Director of the Intellectual Property Program.

45 – SUFFOCATION: SUPPORTED BY THE U.S. FEDERAL GOVERNMENT

Mona L. Hymel

Most of us have experienced riding an elevator with strangers. Many of us have experienced the slightly uncomfortable feeling as strangers continue entering the elevator until it is full or maybe even touching strangers as the elevator fills. People vary worldwide in the amount of private space they are accustomed to enjoying. In other words, how many people have to get onto the elevator with you before you feel physically uncomfortable? Assume that so many strangers crowd on to the elevator that, as clean air in the elevator runs out, they will all suffocate to death. The elevator story provides a simple picture of humanity's ultimate demise. This article discusses the situation of the strangers; a growing population. The article explains the most serious contributors to the increasing number of strangers: (1) existing government pronatalist policies; (2) the ugly secrets of immigration; (3) artificial intelligence dramatically reduces the need for humans; and (4) the impacts of worldwide growth.

Like the elevator, the impact of population on Earth's wellbeing is nothing more than a scientific equation – Carry Capacity. For an elevator, consider the size of the elevator; any life sustaining resources available; the number of people supported by the elevator; and its resources before they begin to suffocate or starve to death. Fortunately, Earth has abundant space and resources. But we know that space, resources, and the population are all in critical condition. Scientists estimate that the Earth's carrying capacity is reaching its limits. Moreover, increasing immigration and the significant increase in sourcing jobs to AI could result in the overall carrying capacity of the earth to decline. Yet, the United States operates on a growth model that can no longer be sustained. "Growing the U.S. economy" must be replaced. As population continues to grow and resources decline (jobs taken by AI), carrying capacity must be adjusted to avoid world tragedy. The elevator is full!

By analyzing U.S. Federal tax policy, the article suggests changes and additional work to be done. For example, the U.S. tax law contains conflicting tax provisions both encouraging and discouraging population growth. This article discusses how population growth negatively impacts the environment; the U.S. policies on population as subsidized through the tax system; and alternative tax policies to mitigate U.S. population growth and repeal of existing pronatal policies.

Key words:

Artificial intelligence, population growth, tax policy, US policy

Biographical note

Mona Hymel is the Arthur W. Andrews Professor of Law at University of Arizona, James E. Rogers College of Law. She has taught courses on Federal Income Taxation of Individuals; LLC, LLP, and Partnership Taxation; Trusts and Estates; Tax Policy; Corporate Tax Policy; Accounting and Finance for Lawyers; and Professional Responsibility. She has published widely on the subject of taxation and tax policy, writing for numerous law journals, reviews and symposiums.

46 – WHY WE SHOULD NOT FORGET ABOUT ‘EQUITY’ WHEN REFORMING FOSSIL-FUEL SUBSIDIES

Eugenia Merayo

Significant amounts of public resources are allocated to fossil-fuel subsidies around the world, for example in the fisheries sector. They exacerbate overfishing and environmental degradation by artificially reducing operating costs and promoting over-consumption. Relying on fossil-fuel subsidies ignores their damaging impact in terms of climate change and environmental sustainability. The path to a low-carbon economy requires reforming fiscal policies in order to divert these public resources to other sectors or technologies in line with a transition to a more sustainable and greener world.

Removing environmentally harmful subsidies benefits society as a whole. It helps fight climate change and environmental degradation and frees up resources that can be redirected towards more sustainable uses, in socioeconomic and environmental terms.

However, as in any other reform process, there are winners and losers. An assessment of the impacts of fiscal reform on different social groups, such as women or youth, is mandatory to ensure existing inequalities are not exacerbated. This can also help towards achieving other policy and development goals – such as SDGs – and ensuring social support for reform.

Barriers to fiscal reform are linked to political will, power structures and social opposition. In order to overcome these barriers and achieve a successful - efficient and equitable - subsidy reform, several elements need to be considered. It requires adequate design, framing and timing. Because some groups are likely going to be negatively affected by the reform, compensation measures and complementary policies must be put in place for the most vulnerable ones.

Fiscal reform needs to involve all relevant stakeholders and enjoy political support and commitment, as well as adequate institutional capacity. At national level, the political and legal framework, the availability of human and financial resources, the degree of institutional coordination and the role and engagement of civil society all affect the plausibility of reform.

Key words:

Environmentally harmful subsidies, Social equity

Biographical note

I'm a researcher at the Blue Economy team at IIED, working in incentive-based management schemes, valuation of small-scale fisheries, fiscal reforms. I'm an environmental economist and have been working in fisheries for the last few years, as a university researcher first and then at the Spanish department of Fisheries, before joining IIED. My main interest relates to the role of public tools such as subsidies and taxes in incentivising sustainable behaviour in fisheries. Also, the impacts of fiscal policies in equity and distribution of resources among different social groups, such as women, youth or ethnic minorities.

47 – SUSTAINABLE ENERGY DEVELOPMENT IN SELECTED EU MEMBERS: FRAMEWORKS AND POLICIES

**Claudia Kettner, Daniela Kletzan-Slamanig, Angela Köppl,
Beate Littig, Irina Zielinska**

Two major international frameworks provide landmarks for future development paths: the UN Sustainable Development Goals (SDGs) and the Paris Climate Agreement. In monitoring the progress towards achieving the set goals a multitude of synergies and trade-offs has to be considered. In this paper we use composite indices to analyse climate and energy policies in Austria and other selected European countries.

The analysis of the composite indices for sustainable energy development for the selected countries deliver several results that are also supported by a more detailed assessment of climate and energy policies. In general, the improvements in terms of energy efficiency, GHG emissions and deployment of renewables have been moderate in the period analysed (2005 – 2015). This hints at the time needed for a significant restructuring to take place. Some countries showed above average positive developments. These are mainly countries that have a long tradition in ambitious environmental and climate policy making and are also renowned for their social security systems (e.g. Denmark, Sweden). In contrast, Poland still focusses its energy policy on coal and will continue to do so.

The description of the circumstances and policy frameworks in the selected countries shows, that each one is characterised by a very specific energy system (complemented by specific social structures) that determines the challenges that have to be overcome on the way to decarbonisation. Thus, climate and energy policies have to be customised in order to result in a successful strategy for the respective country. However, the costs of climate policy measures have to be taken into account and especially with regard to effects on low income households targeted compensation mechanisms have to be developed.

Thus, policies for decarbonisation are required to have a long-term horizon, establish a stable framework ensuring investment certainty and predictability for consumers and firms and to be evaluated regularly with respect to their effectiveness.

The development of the policy framework ought to be founded on evidence based, transparent discussions in order to reach broad societal support. In this context a balance between social and environmental issues has to be reached as these areas are often regarded as being conflicting. But as particularly the examples from the northern countries show it is possible to combine ambitious environmental policies with comprehensive social welfare states.

Key words:

Sustainable development, Composite indices, Energy policy, Climate policy, Cross-country comparison

Biographical note

Daniela Kletzan-Slamanig is senior economist at the Austrian Institute of Economic Research (WIFO). Her main fields of research are economic instruments in environmental policy with a focus on climate change, environmental taxation and environmentally counterproductive subsidies.

48 – ENVIRONMENTAL TAXATION AND SOCIAL EQUITY IN LOW- AND MIDDLE-INCOME ECONOMIES

Jacqueline Cottrell

This paper explores whether and in what ways environmental taxation has the potential to bring about environmental improvement with no or positive impacts on social equity in low- and middle-income countries. The first part of the paper looks at existing theoretical literature, research and modelling on the environmental, social and economic impacts of environmental taxation in low- and middle-income countries. The paper examines the equity impacts of environmental taxes in relation to a range of tax bases and considers how these impacts affect different social groups, including an examination of the different impacts of environmental taxes by gender. It also relates the analysis to the economic, social and environmental impacts of four environmental tax instruments in Vietnam, Morocco, Mexico and China. This enables an approximate delineation of environmental taxes that are more likely to be progressive, and those more likely to be regressive. It also facilitates the identification of policy areas within which particular care is needed when implementing environmental taxation to prevent or mitigate negative equity impacts.

The paper goes on to highlight the potential role of environmental taxes in low- and middle-income countries within broader packages of measures to realise equitable low-carbon development to deliver improved environmental quality alongside greater social cohesion. It demonstrates that environmental taxes are of particular interest to low- and middle-income country governments, because environmental taxes have the potential to improve environmental quality and reduce the negative impacts of pollution on human health without having negative social consequences, as well as being cost-effective instruments and indeed in many cases, a source of additional government revenue.

The paper concludes by putting these findings in the international policy context. In 2015, all UN member states committed to the achievement of the Agenda 2030 and the Sustainable Development Goals (SDGs) by 2030, which the UN Sustainable Development Solutions Network has estimated will require investment of roughly USD 1.4 trillion annually. In the 2015 Addis Ababa Action Agenda of the third international conference on financing for development, member countries committed to financing this process, at least in part, through domestic revenue mobilisation. While environmental taxes cannot meet the financing requirements of the Agenda 2030 in isolation, they have potential to be implemented as a source of domestic revenue mobilisation for the achievement of SDGs.

Key words:

Equitable development, Social cohesion, Sustainable development goals

Biographical note

Jacqueline has been a freelance environmental policy consultant specialising in environmental fiscal policy and inclusive green economy since 2004. She has developed several human capacity development programmes for international development cooperation organisations, including a four-year programme for ministries implementing Vietnam's Green Growth Strategy on behalf of GIZ. Organisations she has worked for include UNOSD, UNITAR, UNESCAP, GIZ, IISD, IEA-RETD, Green Budget Germany and Green Budget Europe. Jacqueline has published widely in the field of environmental economic policy, including most recently *A Climate of Fairness: Environmental Taxation and Tax Justice in Developing Countries* with Tatiana Falcão. She is based in North Berwick, Scotland.

49 – THE IMPACT OF FISCAL AND POLITICAL DECENTRALISATION ON ENVIRONMENTAL MANAGEMENT IN INDONESIA

Hope Ashiabor and Dahliana Hasan

Indonesia is the world's fifth largest emitter of greenhouse gases. This is primarily due to the conversion of its forests and carbon rich peat-lands, as well as its dependence on fossil fuels just as in every modern economy.

A little over a decade ago, the government decentralized its governance structures, in response to recommendations from major international donors such as the World Bank. Flowing on from this, the regulatory competence devolved from the central government sphere to the sub-national level. As a consequence of this shift, the regulatory competence on matters that had a bearing on the regulation of environmental management such as environmental taxes, as well as energy pricing *inter alia* were delegated to governments at sub-national level.

The key issue that this paper seeks to address is: in light of the regionalized regulatory framework, what is the most correct and efficient relationship between national oversight and sub-national taxes with respect to environmental taxation? This issue is explored in-depth in the context of the country's geography – (being an archipelago that is comprised of approximately 17,508 islands within its territory). As the central government itself does not levy any specific environmental tax, the paper examines the foregoing issues in the wider context of how it co-ordinates domestic policy coherence with its international commitments to combat global climate change.

Key words:

Decentralised governance, Regulatory coherence, Greenhouse gases, Environmental taxes, Energy taxation

Biographical note

Dr Hope Ashiabor is an Associate Professor of Law in the Faculty of Business and Economics, Macquarie University, Sydney - Australia. He is also a Chartered Tax Advisor with the Taxation Institute of Australia. His research is in the areas of environmental taxes, the regulatory aspects of carbon finance, and international tax policy – areas in which he has published extensively. He is co-editor to the leading series – *Critical Issues in Environmental Taxation* (Edward Elgar, UK) and a member of the editorial board of the *Asian Journal of Accounting and Governance*. Prior to joining Macquarie, Hope worked as a state attorney; and before that was an in-house counsel to a commercial bank.

Dr. Dahliana Hasan is a senior lecturer at Law Faculty, Universitas Gadjah Mada (UGM), Yogyakarta-Indonesia. Her major teaching subject is Indonesian Taxation Law and Tax Dispute. From 2017 to present, She is a Vice Dean for Academic and Student Affairs at the same Faculty. After completing her doctoral degree in Macquarie University, Sydney – Australia, She actively engages in research with topic related to her expertise such as local taxes as well as environmentally related taxes in Indonesia. She also acts in advisory tax matters for government of Indonesia both local and national levels.

50 – INTERNATIONAL CAPITAL TAXATION AND STRATEGIC POLLUTION CONTROL

Nikos Tsakiris, Panos Hatzipanayotou and Michael S. Michael

A dominant current policy debate is that in the presence of cross-border pollution, such as greenhouse gas emissions, decentralized policymaking can lead to socially inefficient outcomes. Related to this, countries engaging in international competition due to deeper economic integration in capital and commodity markets have incentive to relax environmental standards.

Oates and Schwab (1988), in a seminal contribution, challenge the “conventional wisdom” of race to the bottom in environmental policies as a result of non-cooperative policy behaviour. In a multi-jurisdictions model with local pollution, decentralized policymaking can achieve efficient resource allocation, and if jurisdictional capital taxes are optimally chosen, then the local governments set emissions standards efficiently. Ogawa and Wildasin (2009), here on (OW) confirm the Oates and Schwab (1988) result of efficient resource allocation in the case of transboundary pollution. Eichner and Runkel (2012), in the same framework of inter-jurisdictional competition, show how the elasticity of capital supply with respect to the net rate of return to capital can affect the decentralized policy equilibrium. Fell and Kaffine (2014) in a multi-jurisdictions, capital mobility and inter-jurisdictional pollution model introduce, first, “capital retirement”, i.e., the possibility that the overall inter-jurisdictional capital stock is not fully allocated among them, thus leading to variable level of aggregate environmental damage, and second, a costly abatement activity. They show that the decentralized policy outcome generally differs from the solution of a centralized planner’s social welfare-maximizing problem.

Our paper examines the efficiency of decentralized (non-cooperative) policymaking in the presence of international externalities, such as capital mobility and cross-border pollution. Along the lines of the aforementioned studies, pollution is related to supply of capital in a region. We raise the following consideration. Can decentralized environmental policymaking be efficient, when regions are large in capital markets and can influence the net return to capital?

Key words:

Cross-border Pollution, International Capital Mobility, Strategic Environmental Policy, Rules for International Taxation of Capital

Biographical note

Nikos Tsakiris is an Assistant Professor in the Department of Economics at the University of Ioannina. He received his PhD in Economics from Athens University of Economics and Business in 2007. He joined the department of Economics, University of Ioannina, in October 2009. He has also taught in the University of Cyprus. His current research fields are in the area of International Trade Theory and Policy, Capital Tax Competition, Trade and Environment, Strategic Environmental Policy, International Commodity Taxation, Public Goods.

51 – HOW TO REACH PARIS. A COMPREHENSIVE LONG-TERM ENERGY-ECONOMY SCENARIO FOR AUSTRIA

Ina Meyer, Mark Sommer and Kurt Kratena

The paper developed a comprehensive energy-economic scenario 2050 for Austria considering the international climate policy after the COP21 in Paris (2015). The scenario shows, firstly, reaching the Paris climate goals of reducing energy-related greenhouse gas emissions by at least 80-90 percent by 2050 (compared to 1990) is principally feasible for Austria, albeit only with a broad range of fundamental political measures cutting across all social and economic sectors, and, secondly, what consequences this would generate for the Austrian economy.

The modelling of the scenario was done by coupling technology-oriented sectoral bottom-up models with a top-down model – the WIFO.DYNK (Dynamic New-Keynesian) model of the Austrian economy. The main relevant characteristics for applying the model in analyzing energy scenarios are: 1) disaggregation into 62 industries/goods and 47 categories of private consumption, 2) consistent integration of the Austrian energy balance by linking physical and monetary flows. This means, firstly, that economic drivers of energy use (GDP, vehicle stock, housing stock, efficiency of stocks, etc.) are not based on assumptions but model results. Secondly, these links automatically yield economic impacts of changes in the energy system. Interlinked bottom-up models mainly refer to electricity and heat generation, basic metal production, transport und buildings.

A comprehensive package of measures to achieve the Paris climate goals was evaluated. International CO₂ prices as a rational decision-making basis for investors and households in orienting their activities towards decarbonization were considered.

Results show, to achieve national climate targets, a reduction in energy consumption is key. Investment in technology-led energy efficiency gains for capital and consumer goods as well as changes in behaviour and lifestyle regarding energy-relevant demand patterns are required. A mandatory reduction in final energy demand to 599 PJ was calculated for 2050. An extensive restructuring of the energy system towards renewable energy sources and electrification is compulsory in all sectors and at all levels of energy use.

Considerable investments in a low-carbon economy set significant growth impulses for the Austrian economy. Cost-savings through lower energy bills are responsible for income effects that generate an economic stimulus. Ultimately, this increases the average annual GDP growth rate to 1.7 percent p.a. (compared to 1.5 percent in a baseline) with a significant fall in energy demand in the main aggregated sectors. Growing the economy is thus compatible with climate protection – and is possible with climate protection only as otherwise significant and costly climate damages must be considered.

Key words:

Energy scenarios, Energy-economic impact analysis, Paris climate goals, Model analysis

Biographical note

Ina Meyer is a senior economist at the Austrian Institute of Economic Research (WIFO) specializing in the field of climate change economics, mitigation and adaptation strategies, sustainable development, interdisciplinary and transdisciplinary research approaches, and the green or circular economy concepts. Her current research activities comprise policy- and application-oriented research in national and international academic research projects.

52 – ENVIRONMENTAL REGULATION AND MANDATORY DISCLOSURE PROGRAMS

J. C. Elnaboulsi

While during the 1960's and 1970's, earlier wave of environmental policies focused on command and control regulation, market-based approaches have been developed in the 1980's to shape negative environmental externalities. Over the last few years, however, there has been a clear surge in environmental regulation that requires polluters to disclose industry-related information. Mandatory disclosure programs have become the yardstick by which regulators, investors, non-governmental organizations and local communities measure firms' environmental performance.

Today, public authorities use significantly information regulation as a means to address a wide range of environmental issues including greenhouse gas emissions. The widespread acceptance of such programs is channelled by the presumption that providing environmental information will lead to an improvement in environmental quality by assisting broader public decision making such as public policy development and environmental regulation. Despite some empirical concerns raised regarding these programs, the recent trend shows that regulation through disclosure may be an efficient complement to conventional regulatory approaches and may have a significant effect on the environmental performance of firms and future compliance and emissions.

In this work, we will focus on the law and economics with respect to publicly disclosed environmental information. Mainly, we examine the effectiveness of environmental regulation through disclosure practices as a policy approach to reduce pollution and emissions, and analyze its role in supplementing traditional approaches. In particular, this work addresses the potential uncertainty-reducing role of mandatory disclosed information and its impact when environmental regulation is already advanced. We shed light on the conditions under which information-based regulation may improve environmental performance. For instance, we show that disclosure is a valuable public good, provides greater transparency in the market, and is generally efficiency enhancing by allowing a substantial decrease in the use of environmentally harmful inputs. Information-based regulation can also be used in different environmental fields when traditional regulatory policies seem ineffective such as non-point sources pollution.

Key words:

Environmental Regulation, Pollution Emissions, Disclosure Programs, Information Regulation, Public Information, Asymmetric Information.

Biographical note

Associate Professor and Habilitation in Economics at the University of Bourgogne Franche-Comté (UBFC), France. He also worked as Research Economist at The French Institute of Agricultural and Environmental Engineering Research (*IRSTEA*), and The National School for Water and Environmental Engineering, Strasbourg (*Engees*). In 1997, he was Visiting Researcher, University of Colorado at Boulder, Environment and Behaviour Program, Institute of Behavioural Science. He is the program co-director of the Master in Economics at the UBFC and elected member of the Academic Council. His research interests are Environmental and Resources Economics, Regulation, Contract Theory, Pricing Policies and Modeling. Some of his last publications are: "On the Social Value of Disclosed Information and Environmental Regulation", "An Efficient Pollution Control Instrument in Achieving Sustainability: the Case of EU Urban Wastewater Pollution", "An Incentive Water Pricing Policy for Sustainable Water Use".

53 – INTER-INDUSTRY LINKAGES AND AIR-POLLUTION: EVIDENCE FROM THE EUROPEAN UNION

Elias Giannakis, Jonilda Kushta

Excess mortality attributed to airborne fine particulate matter (particles with a diameter $< 2.5 \mu\text{m}$, PM_{2.5}) has been estimated to reach million excess deaths annually worldwide. This study aims to provide a holistic assessment of the economy-wide effects of the inter-industry linkages of production sectors on air quality and public health. Specifically, we aim to assess the direct and indirect contribution of the sectors of economic activity of the European Union (EU) to the emissions of the main atmospheric pollutants, namely, sulphur oxides (SO_x), nitrogen oxides (NO_x), ammonia (NH₃), non-methane volatile organic compounds (NMVOC), carbon monoxide (CO), PM_{2.5} and coarse particles with a diameter $< 10 \mu\text{m}$ (PM₁₀), accounting for all monetary inter-industry transactions. Environmentally-extended input-output analysis (EE-IOA) models, which link sectoral air pollution emissions with the financial transactions of the economic sectors, have been developed, one for the EU-28 economy and individual twenty-eight models for each of the EU member states, to analyse the drivers of environmental changes associated with air pollution emissions. The EE-IOA analysis indicated that shipping generates the largest SO_x (8.5 tn/M€), NO_x (23.7 tn/M€), PM_{2.5} (1.8 tn/M€) and PM₁₀ (2 tn/M€) emissions across EU-28, meaning that for every 1 M€ increase in the final demand for the products and services of the shipping sector, 8.5 tn of SO_x will be emitted (respectively for other pollutants). Regarding NH₃ and NMVOC, agriculture is the top emitter in the EU-28.

Next, the Weather Research and Forecast model coupled with chemistry (WRF/Chem) will be used to assess the changes in air pollution associated with the projected changes in the emissions driven by the final demand for the output of the six most air polluting economic sectors of EU-28, that is, agriculture, industry, electricity, air transport, shipping and land transport. The annual mean PM_{2.5} concentrations estimated from the simulations of the WRF-Chem for each of the six scenarios (versus the control simulation) will be used to estimate excess mortality rates for a range of related diseases and age groups, based on integrated exposure response functions. Policy recommendations will be provided for addressing air pollution triggered by economic activity.

Key words:

Air pollution, Environmentally-extended input-output analysis, WRF-Chem, Europe, Premature mortality

Biographical note

Dr. Elias Giannakis is currently an Associate Research Scientist in economics and natural resource management research at the Energy, Environment and Water Research Center of the Cyprus Institute. He received his PhD in agricultural economics from the Agricultural University of Athens, Greece in 2011. His expertise includes the development and application of environmentally-extended economic models for policy impact assessment at national and regional level, the non-market valuation of environmental resources, and spatial economics. He is currently working on coupling economic models with bio-physical models and on analysing the economic and environmental costs, benefits and trade-offs of climate change adaptation options. He has authored and co-authored more than twenty peer-reviewed journal articles and book chapters.

54 – STRATEGIC ENVIRONMENTAL TAX POLICIES WITH NONTRADED GOODS, CAPITAL MOBILITY AND CONSUMPTION POLLUTION

Michael S. Michael, Panos Hatzipanayotou, and Nikos Tsakiris

We build a model with two heterogeneous small open economies and international capital mobility. Each country produces two traded and one non-traded goods. The consumption of one traded good and the non-traded good in each country may generate pollution, which affects negatively the welfare of people in both countries. Within this framework, we show that the Nash equilibrium calls for i) a consumption tax on the polluting goods and ii) a capital tax or subsidy. Specifically, when the consumption of the non-traded good is clean activity and the consumption of the traded good generates pollution, then the Nash equilibrium calls for a capital tax if the polluting good and the nontraded good are substitutes (complements) in consumption and the non-traded goods are capital (non capital) intensive. In the case where the consumption of the traded goods is a clean activity and the consumption of the nontraded good generates pollution, then the Nash equilibrium policy calls for a capital subsidy (tax) if the nontraded good is capital (non capital) intensive. Irrespective of which good its consumption is polluting, the Nash equilibrium policy on capital is efficient while the consumption tax is inefficiently low.

In this framework, the imposition of consumption taxes by Home to control the locally generated consumption pollution causes pollution leakage effects from Foreign and vice versa due to the existence of nontraded goods and international capital mobility. To deal with these pollution leakage effects, governments must use capital taxes or subsidies.

If for some reasons, the governments cannot use simultaneously both policy instruments, but only one, then the Nash equilibrium level of each instrument is chosen in such a way in order to deal with both, the locally generated consumption pollution and the pollution leakage effect from the other country. Thus, when only consumption taxes are available, the Nash equilibrium policy calls for a lower consumption tax compared to the case where both policy instruments are available. When only capital taxes are available, the Nash equilibrium policy on capital calls for a lower capital tax or even a subsidy (lower capital subsidy or even a tax) compared to the case where both policy instruments are available. In the special case where the two countries are symmetrical and the cross border pollution is perfect, then the Nash equilibrium policy on capital is a zero tax.

Key words:

Pollution Leakage, Nontraded Goods, Capital Mobility, Capital and Consumption taxes, Consumption generated Cross-Border Pollution

Biographical note

Michael S. Michael holds a PhD in Economics (1987) from the State University of New York at Buffalo. He has worked as Assistant Professor (1987-93) and Associate Professor of Economics (1993-95) at the University of Connecticut. From 1993-99 he is at the University of Cyprus as Associate Professor and from 1999-present is a Professor. He is a Research Associate of the Center of Economic Studies & Ifo Institute for Economic Research (CESifo), Germany. His research appears in Journals such as, Canadian Journal of Economics, *Economica*, *Economics Letters*, *Environmental and Resource Economics*, *Journal of Development Economics*, *Journal of Environmental Economics and Management*, *Journal of Public Economic Theory*, *Journal of Public Economics*, *Review of Development Economics*, *Review of International Economics*, *Scandinavian Journal of Economics* and CESifo economic papers.

**55 – LESSONS FROM (NOT) LINKING CARBON MARKETS:
A COMPARATIVE ANALYSIS OF THE TOKYO – SAITAMA
AND NEW ZEALAND – AUSTRALIA CASES**

Sven Rudolph, Takeshi Kawakatsu, Elena Aydos, Achim Lerch and Joseph Dellatte

What makes linking (un)successful? This is the question we would like to address in our GCET20 contribution.

The Paris Agreement urgently needs underpinning by ambitious domestic policies. Cost efficient greenhouse gas (GHG) cap-and-trade, or emissions trading, is still a promising tool, particularly with increasing mitigation costs in sight. Traditional economic theory emphasizes that linking domestic schemes even increases efficiency, but linking can also make cap-and-trade schemes more sustainable, as shown in an earlier study presented by the authors at GCET17 in 2016. No least, Art. 6 of the Paris Agreement explicitly allows trading of Internationally Transferred Mitigation Outcomes (ITMO) and thus also opens the door widely for market-to-market linkages. Empirical evidence on linking, however, is limited to some successful cases in North American, Europe, and Japan, while failed attempts include the European Union – Australia and the New Zealand – Australia links.

Against this background we comparatively analyze the successful Tokyo – Saitama and the failed New Zealand – Australia cases. We use Sustainability Economics, Public Choice, and Institutional Economics reasoning in order to evaluate the political process leading to (not) linking, the institutional setting, in which linking did (not) occur, and the consequences of (not) linking. By doing so, we can identify the technical, institutional, and political prerequisites for successful linking as well as respective barriers to linking.

Key words:

Climate policy, sustainability, emissions trading, linking

Biographical note

Sven Rudolph is Associate Professor at Kyoto University's Hakubi Center / Graduate School for Global Environmental Studies, Japan. He holds a doctoral degree in economics from Kassel University, Germany. His expertise is in environmental economics and political economy. Besides being a passionate university teacher, Sven has given more than 90 lectures at international conferences and workshops, and he has published four books and more than 80 articles. Sven has work experience as an environmental NGO campaigner and as a policy advisor for the German and Japanese governments. He has extensive experience in international collaboration across disciplinary boundaries with researchers in Germany, Japan, USA, Australia, and New Zealand. His current research is focused on linking domestic carbon markets in the Pacific region and climate justice in carbon market design.

56 – ALLOWANCE TRADING IN THE EU ETS: EVIDENCE FROM EUTL TRANSACTION DATA

Claudia Kettner

The EU Emission Trading Scheme (EU ETS) is the key instrument in EU climate policy since its start in 2005. Currently, it covers mainly emissions from manufacturing and energy supply in the 28 EU Member States, Norway, Liechtenstein and Iceland, and respectively more than 45 per cent of total EU greenhouse gas emissions.

The idea of emissions trading reflects the fact that the costs of emission abatement differ between regulated installations, i.e. it is costlier for some installations to comply with a certain emission limit than for others. Actors could benefit in a situation where those with lower emission abatement costs reduce their emissions below their predefined emission limit and sell the surplus reductions to actors with higher abatement costs who will in turn be allowed to emit more than their initial limit. This paper contributes to the literature on the empirical evidence on trading in the world's largest trading scheme for greenhouse gas emissions and provides insights on the involvement over the first and second trading phase.

The analysis is based on data from the EU Transaction Log (EUTL; formerly Community Independent Transaction Log, CITL) where data on allocated allowances, emissions and surrendered allowances are collected on installation level. Moreover, information on each completed transaction recorded by the EUTL is disclosed on 1 May of the third year after the transaction is recorded in accordance with Annex XIV (4) of Regulation 389/2013. This means that as of May 2019 full information on the allowance transactions in Phase 1 – which covered the period 2005 to 2007 – and Phase 2 – which ran from 2008 to 2012 – as well as for the first three years of Phase 3 will be available at the EUTL.

This paper will analyse allowance transactions in the EU ETS in the period 2005 to 2015 focussing on the country level. It will be investigated whether (and how) allowance imports and exports changed since the start of the EUTS. Particular emphasis will be put on potential changes between the different trading periods and the role of allowance surpluses and deficits (on country and installation level) for trading activity.

Key words:

Climate policy, Emissions trading, Europe

Biographical note

Claudia Kettner holds a Master's degree in Economics from University of Graz and a Master in Renewable Energies from Vienna University of Technology. Between 2005 and 2008 she worked as a researcher at the Wegener Centre for Climate and Global Change at the University of Graz and was involved in projects at WIFO and Joanneum Research, Graz. Since 2008 she works as environmental economist at the research group "Energy, Agriculture and Environment" at WIFO that she has been coordinating since 2015. Her key areas of research include EU and Austrian climate and energy policy (with focus on the role of market-based instruments). Her professional experience includes participation in EU FP6 and FP7 projects as well as coordination of and participation in many national projects.

57 – ANALYSIS OF CARBON CREDIT BILLS IN BRAZIL

Denise Lucena Cavalcante, Caroline Cunha Alencar, Felipe Sousa Almeida
and Lucas Sampaio Dias Lourenço

With the occurrence of the 21st Conference of the Parties (COP21) of the United Nation Framework Convention on Climate Change (UNFCCC) in Paris, which took place on December 11, 2015, the countries adopted as their main objective, analyzing a long-term vision, to limit the rise of global average temperature below 2°C in relation to pre-industrial levels using the premise of low carbon or "decarbonization". In Brazil, the Government committed to reduce greenhouse gas emissions by 37% by 2025 and by 43% by 2030, compared to emissions in 2005. Aiming at achieving this goal, measures such as restoration and reforestation of forest hectares, environmental subsidies, diversification of the Brazilian energy source, through an increase in sustainable bioenergy by 18% by 2030 and an estimated 45% share of renewable energy in this energy source by the same date, are the main mechanisms for this change. However, until this year, Brazil is still in a long process regarding the regulation of carbon pricing, which, according to the Brazilian Business Council for Sustainable Development (CEBDS) and scholars in the area, carbon credit will be a great advantage for Brazil because of its vast forest region, as well as being highly beneficial for the economy, since there is a great chance that carbon credit will be a new Brazilian commodity. Thus, the present research seeks to portray the progress of these discussions having as an analysis the carbon credit bills that are being processed in the National Congress or those that had the discussions finalized and were not converted into law in Brazil, in order to verify the efforts undertaken to reach the commitments signed by the nation in the Paris agreement and, in addition, exercise social control, understood as citizen participation in public management, of these measures being undertaken by the Government and examine whether they are consistent with the objectives of the Paris Agreement.

Key words:

Bill, Carbon Credit, Paris Agreement, Decarbonization, Social Control

Biographical note

Denise Lucena Cavalcante: PhD in Tax Law from PUC/SP. Professor of Tax and Financial Law – UFC. Leader of the Research Group on Environmental Taxation - CNPq. Government Attorney at the Ministry of Finances of Brazil.

Caroline Cunha Alencar: Graduating at the University of Fortaleza (Unifor) in Law, member of the research group Environmental Taxation CNPq, monitor of tax law by the Academic Tutoring Program of Unifor. Intern at the Court of Justice of the State of Ceará 2018-2019.

Felipe Sousa Almeida: Graduating at the Federal University of Ceará (UFC) in Accounting, member of the research group Environmental Taxation of CNPq, Monitor of tax law by the tutoring program of the UFC. Email: felipe2sousa3@gmail.com

58 – CLUSTERING THE ADOPTION OF CARBON PRICING POLICIES: WHAT POLITIES PRICE CARBON?

Jakob Skovgaard, Sofia Sacks Ferrari and Åsa Knaggård

Carbon pricing, including carbon taxes and emissions trading, has been adopted by different kinds of polities worldwide. Yet, beyond the increasing adoption over time, little is known about what polities – countries as well as sub- and supranational entities – adopt carbon pricing and why. The paper provides a global mapping of all decisions to adopt or considerations of adopting carbon pricing policies. The paper explores patterns of adoption through cluster analysis with the purpose of investigating factors that could explain polities' decisions to adopt carbon pricing. The study contributes empirically by studying carbon taxes and emissions trading together and by ordering the polities adopting carbon pricing into clusters and, conceptually, by identifying propositions about the adoption of carbon pricing to be tested in future research. We found 167 cases of polities considering carbon pricing, including 66 adopted policies, 52 under consideration, and 49 abandoned. The cluster analysis of adopted policies identified five clusters: early adopters, North-American subnational entities, Chinese pilot provinces, second-wave developed countries, and second-wave developing countries. The analysis indicates that the reasons for adopting carbon pricing has shifted over time. While international factors (climate commitments, or influences from polities within the same region) are increasingly important, domestic factors (including crises and income levels) were important for the early adopters.

Key words:

Carbon pricing; Carbon tax; Emissions trading schemes; Policy instruments

Biographical note

Jakob Skovgaard is associate professor in political science at Lund University (Sweden), undertaking research on national, EU and international climate politics, and holds a doctorate from the European University Institute in Florence. His research interests include the role of economic objectives within climate politics, as well as interaction between the international and domestic level. From 2007 to 2010 he worked in the international climate change team of the Danish Finance Ministry. Recent publications include articles in the journals *Global Environmental Politics* and *Journal of Common Market Studies*, and the edited volume *The Politics of Fossil Fuel Subsidies and Their Reform* (2018, Cambridge University Press).

59 – RECENT TRENDS IN ENVIRONMENTALLY RELATED TAXES AND SUBSIDIES: THE ITALIAN OUTLOOK

Andrea Zatti

The use of economic instruments in environmental policies has attracted a wide and increasing interest in the international and European debate in recent decades. Environmental taxes and subsidies, in particular, have been seen as useful policy instruments to enhance environmental protection, getting the price right and creating market based incentives for environmentally-friendly behaviours. Despite these premises, the actual implementation of EFRs has often lagged behind their full potential, leading to marginal changes in the fiscal system.

In this paper we describe the main characteristics of, respectively, environmentally related taxes and environmentally related subsidies at present implemented in Italy, designing some possible evolutionary paths, both on the revenue and expenditure side. The Italian experience turns out to be, in this perspective, an interesting case study, for several reasons. Firstly, because both taxes and subsidies have, in the past, been largely exploited for the attainment of wider economic and social objectives, often without a full ex-ante and ex-post assessment of their level of environmental merit. Secondly, because the recent economic crises exacerbated the need for high-debt countries to find growth-friendly and less distortive ways to correct budget imbalances, reforming and optimizing both the revenue and the expenditure side of the public intervention. Thirdly, because many international organizations and scientific agencies have recommended that Italy develop its environmental fiscal reform, with the indispensable steps of introducing new green taxes, restructuring existing ones and removing environmentally-harmful subsidies.

All in all, the analysis leads to the conclusion that the key objective should be that of selectivity: i.e. that of tackling environmental challenges in an effective way, aligning taxes to closer reflect environmental damage, benefits and priorities, and without having revenue-generating potential as the first driving force of future initiatives.

Key words:

Environmentally-related taxes, Environmental-fiscal reforms, Environmentally-harmful subsidies, Public budgets, Italian experience.

Biographical note

Andrea Zatti is a researcher of Public Finance in the University of Pavia and teaches “European public finance” and “Public Policy and the Environment” in the Faculty of Political Science of the University of Pavia. He is President of the Romagnosi Foundation-Local Government School and Rector of the Cairoli College. He has worked in the research area with APAT (Italian National Environmental Agency), CIRIEC (Centre Interdisciplinaire de Recherches et d’Information sur le Entreprises Collectives) and OCSE on environmental and territorial issues.

60 – HARMFUL SUBSIDIES TO THE ENVIRONMENT IN THE BRAZILIAN ENERGY SECTOR

Denise Lucena Cavalcante, Caroline Cunha Alencar, Felipe Sousa Almeida
and Lucas Sampaio Dias Lourenço

In a global context, the use of electricity from energy sources with a high environmental impact accelerates the process of environmental degradation, which is why the countries are seeking an effort to propose measures that ensure a more sustainable development, close to a clean profile model, favoring environmental protection and energy efficiency growth. With the 21th Conference of the Parties (COP21) of the UNFCCC in Paris, countries have adopted as their main objective, analyzing a long-term vision, to limit the rise of the global average temperature increase below 2 ° C in relation to pre-industrial levels. The condition for the realization of such phenomenon of the reduction of the emission of CO₂ in the atmosphere, being, therefore, conceptualized as a low carbon policy. In view of this, these measures indicate new directions for environmental treatment worldwide. In this perspective, several countries use mechanisms such as fiscal incentives, subsidies, tax exemptions, as a way to accelerate the achievement of their sustainable economic objective and to give the private sector a central role in environmental preservation. Thus, Brazil, contrary to the measures adopted worldwide and to the prospects necessary to ensure sustainable development, has been adopting several examples of actions contrary to this idea of environmental protection and is implementing subsidies (monetary value fixed and granted by the State for a certain purpose aiming at the public interest, representing an important role for the country's economy) harmful to the environment. According to the research conducted by the Institute of Socioeconomic Studies (INESC), in the period from 2013 to 2017, was granted the amount of R \$ 342.36 billion in subsidies for fossil fuels, equivalent to 1% of the country's GDP. Therefore, the present study seeks to map the environmentally harmful subsidies in the Brazilian energy sector, helping to identify a divergent reality of global efforts for sustainable economic development and to suggest a fiscal alternative to the use of such harmful mechanisms.

Key words:

Environmental Law. COP-21. Low carbon policy. Environmentally damaging subsidies

Biographical note

Denise Lucena Cavalcante: PhD in Tax Law from PUC/SP. Professor of Tax and Financial Law – UFC. Leader of the Research Group on Environmental Taxation - CNPq. Government Attorney at the Ministry of Finances of Brazil.

Caroline Cunha Alencar: Graduating at the University of Fortaleza (Unifor) in Law, member of the research group Environmental Taxation CNPq, monitor of tax law by the Academic Tutoring Program of Unifor. Intern at the Court of Justice of the State of Ceará 2018-2019.

Felipe Sousa Almeida: Graduating at the Federal University of Ceará (UFC) in Accounting, member of the research group Environmental Taxation of CNPq, Monitor of tax law by the tutoring program of the UFC. Email: felipe2sousa3@gmail.com

61 – FISCAL INSTRUMENTS FOR BIODIVERSITY IN GERMANY

Kai Schlegelmilch

Several fiscal instruments promote, but often rather hinder the promotion of biodiversity in Germany. The interplay of such fiscal instruments and often existing regulatory policy in the form of command-and-control-policies is considered to identify the room for application of fiscal instruments.

The reduction of biodiversity-harmful subsidies and the introduction of taxes on biodiversity-harmful activities offer a large potential. Since biodiversity is mostly affected by the way land is used, the largest land user, namely agriculture, is at the core of considerations. Hence, the impacts of subsidies on biodiversity are analysed, particularly those under the European Common Agricultural Policy (CAP).

Furthermore, taxes and charges which reduce biodiversity-harmful activities such as the use of fertilisers and pesticides are also discussed. Not at least since the scientific evidence that such chemical substance contribute substantially to the dramatic reduction of the number and the diversity of insects and birds, and possibly other species, has grown significantly recently.

Neither taxes on fertilisers nor on pesticides are currently applied in Germany, but they are under scientific and partly political discussion. Some institutions consider their taxation necessary for already several decades. Hence, their potential is of interest given the already existing and recently introduced regulations in that area. To this end, international experiences with such taxes are also presented and analysed to allow for deriving lessons learned from their application in these countries.

The co-benefits of additional financial means through such fiscal instruments for biodiversity for the overall financing of nature protection are discussed. The cost-benefit-ratio of such instruments is analysed and the contribution to the general budget is also discussed.

Key words:

Common Agricultural Policy, Biodiversity and nature protection, Pesticides and fertilizer taxation, Environmental taxation, Environmentally harmful subsidies

Biographical details of the presenting author:

Kai Schlegelmilch is a banker and environmental economist. He has more than 25 years of experiences in environmental economics and policies, mainly in the Ministry for the Environment, Nature Conservation and Nuclear Safety where – back in 1999 – he supported the introduction of the Ecological Tax Reform. In his private capacity, he is Chair and Co-Founder of Green Budget Germany (founded 25 years ago in 1994), a think tank on environmental fiscal instruments. Similarly on European level in 2008, he co-founded Green Budget Europe. He wrote many studies and advised many countries on how to implement such instruments. In 2016, he was appointed Member of the UNESCAP Eminent Expert Group on tax and public expenditure. In Viet Nam in 2012, a major environmental protection tax law was implemented after his intensive consultancy. The paper was written during his secondment from the Environment Ministry to the Federal Agency for Nature Conservation, Bonn/Germany.

62 – LOW-CARBON FISH: WHY FISHERIES FISCAL REFORM (ESPECIALLY REDUCING FOSSIL FUEL SUBSIDIES) MUST BE IN THE DECARBONISATION MENU

Annabelle Bladon

Fish production is seen worldwide as an opportunity for growth, jobs and food security, with governments piling up substantial amounts of money every year to leverage private sector investments. It seems to work: in 2016, global fisheries produced over 170 million tonnes of fish, generating about US\$362 billion and providing jobs for almost 60 million people in the capture sector (14% of whom are women). Women's role increases to almost half of the jobs when looking at the wider value chains, although their role has largely been unrecognised. But this largesse is at risk: by 2015, 93% of fisheries were either overfished or being used at maximum sustainable levels. Climate change is rapidly rising sea temperatures and the physical properties of marine ecosystems. Add to this the growing problem of pollution and patchy governance in coastal waters, EEA and high seas, and it is no surprise that economic losses are piling up to over US\$80 billion per year.

Fiscal tools play a big part in the problem, artificially reducing operating costs, increasing private profits for expansion outside exclusive economic zones, and keeping prices that promote over-consumption. Fossil fuel subsidies are probably the biggest culprit behind overfishing and the rise in the sector's carbon footprint. Demersal trawl fisheries, offshore longline fisheries, towed and mobile gears, and depleted, poorly managed stocks are the worst performers in terms of emissions. The majority of the world's fisheries subsidies come from developed countries with annual cash layouts primarily for fleet expansion of €1.2 billion in Japan, €1.7 billion in South Korea, €277 million in Russia, €1.5 billion in the USA and a massive €5.6 billion/year from China through their 'going global' strategy.

But there is hope as well: taking radical action to manage by design and not by default can bring global economic gains of US\$86 billion per year, as biomass of fish recovers. Promoting low-carbon emission strategies can lower fuel costs, reduce greenhouse emissions and reduce the negative impact on natural ecosystems. Such action can be socially and politically difficult. They will require better pricing of fishery resources (such as licences) and decisive action to reduce and eliminate harmful subsidies to reduce over-extraction waste and promote uptake of environmentally friendly and low-carbon gear. It is vital to gather up information on distributional impacts across interest groups, to ensure that negatively affected vulnerable groups are not harmed.

As countries begin to dip their feet into the tide of the Blue Economy, the urgency to find low-carbon pathways gains momentum and we need to ensure that fair reforms in fisheries are on the menu of decarbonisation discussions.

Key words:

Blue Economy, Decarbonisation, Marine ecosystems

Biographical note

Annabelle Bladon (PhD) is a researcher at IIED with seven years of experience working at the intersection of marine conservation science, environmental economics, and sustainable development. She is particularly interested in innovative economic instruments and sources of finance for marine conservation and sustainable fisheries governance – including incentive-based mechanisms such as Payments for Ecosystem Services, private finance, and fiscal reform. She has worked with public and private sector in South Asia, Africa, and the Caribbean. Her main focus is ensuring that these approaches to promoting sustainable resource use and biodiversity conservation.

63 – “ECOBONUS” AND “ECOTAX”: TWO RECENT ITALIAN FISCAL MEASURES TO PROMOTE THE DECARBONIZATION IN VEHICLES SYSTEM

Alessia Tomo

Over the last years, Italy is trying to fight air pollution and reduce dioxide emissions (CO₂ emissions) in the transport sector, following the Paris Agreement’s objectives, and according with the OECD initiative concerning International Transport.

The OECD argues that climate change issues cannot be challenged without decarbonising the transport sector. Indeed, this sector emits around 23% of the energy-related CO₂, which could even reach 40% in 2020. Therefore, the Italian Legislator, within the Italian Budgetary Law for 2019 (Law 148 of 30th December 2018), introduced two different fiscal measures both aimed at reducing atmospheric pollution and promoting decarbonization in the vehicles sector.

The first measure, namely “ecobonus”, is a tax incentive that aims to improve the purchase of low-emissions or electric cars. The second one, namely “ecotax”, is a tax based on CO₂ emissions that must be paid on the purchase of new high-emissions cars. These measures are a kind of fee-bates: policy instruments that give individual incentive to internalise the pollution externalities of specific good, like automobiles, that are already in force in others Countries, like France and Sweden.

On these grounds, the aim of this paper is to analyse the application and impact of these two Italian measures, considering that they could have a good environmental impact on low-emissions and electric cars purchase, shifting consumer purchases to low-carbon cars. Indeed, as recognised by the European Commission, *tax instruments are very effective to incentivise consumer behaviour*.

The results will be also compared with the experiences emerging from the “older” French *Bonus/Malus ecologique* system and the recent Swedish system. Given that these two measures have only recently entered in force (March 2019), it could be quite difficult to catch their environmental impact. However, a first discussion regarding their compatibility with Italian Constitutional principles and the European prohibition of State Aid.

In more detail, the research questions (strongly intertwined) this study aims at answering, sound as follow:

- Are these measures in contrast to Italian Constitutional principle of “ability to pay”?
- Are they in contrast to European prohibition of State Aid?
- Are they in contrast to Italian Constitutional principles of “equality” and “rationality”?

Key words:

Decarbonization, economic policies, CO₂ emissions, private vehicles, tax incentive

Biographical note

Alessia Tomo is a Ph.D. Student in Public Law at University of Naples Parthenope and fellow in Tax Law at University of Naples Federico II, Italy.

64 – DESIGNING ENVIRONMENTAL TAXES TO SUPPORT BIOFUELS FROM A EU STATE AID PERSPECTIVE: THE IMPACT OF THE ENERGY TAXATION DIRECTIVE ON ASSESSING SELECTIVITY OF THE SWEDISH AND FINNISH CO₂ TAXES

Torbjörn Schiebe

To comply with the Paris Agreement and to deal with the threat caused by climate change, the Swedish Parliament has set ambitious targets for greenhouse gas (GHG) reductions. For the transport sector, which accounts for 30% of total GHG emissions, a sub target is to reduce GHG emission by 70% by 2030 compared to 2010 (2030-goal). Biofuels is in this respect considered decisive to reach the 2030-goal. To promote its use Sweden has primarily relied on its CO₂-tax which is levied on fossil carbon emissions, thus exempting biofuels from its scope. Member States' freedom to design environmental taxes to promote eg biofuels is however limited by Union objectives relating to the functioning of the internal market. More specifically, Article 107(1) TFEU prohibit State aid "favouring certain undertaking or the production of certain goods", that is to say selective aid. Moreover, energy taxes, such as the Swedish and Finnish CO₂-taxes, are considered harmonised taxes under the Energy Taxation Directive (ETD). The ETD provides in this respect for motor fuels to be taxed on the basis of volume rather than environmental performance, which means that tax reliefs in favour of biofuels will derogate from the general rule in the ETD and therefore face the risk of constituting selective aid. Assessing tax selectivity is however, as is known, tinted with uncertainty, which is illustrated by the fact that the Commission has continuously considered that the Swedish CO₂-tax scheme entails selective aid in favour of biofuel producers, while seemingly accepting that this is not the case in relation to the Finnish CO₂-tax.

Against this background, the paper deals with the issue of selectivity in the context of the Swedish and Finnish CO₂-taxes. The paper analysis the impact of the ETD on the three-step test developed in the CJEU's case-law to assess selectivity of tax measures, reviewing to this end whether the Swedish and Finnish CO₂-taxes are in fact selective. The paper shows that the internal logic of the ETD, ie taxing all motor fuels on the basis of volume rather than environmental performance, becomes of paramount importance in this analysis. As both the Swedish and the Finnish CO₂-taxes (despite the Finnish CO₂-tax being treated otherwise) in fact appears to be selective the paper concludes that it is imperative that the ETD is amended to enable environmental taxes that is properly oriented towards environmental objectives to not constitute selective aid.

Key words:

State aid, Selectivity, Carbon taxation, Energy Taxation Directive, Biofuels

Biographical note

Torbjörn Schiebe is an LLM student in European Business Law at Lund University, graduating in June 2019, currently writing his Master thesis under the supervision of Assistant Professor Julian Nowag and on which this paper is based. The author came in contact with the issues presented in this paper during his internship at the Swedish Ministry for Foreign Affairs, and has had the privilege to receive great help in discussing the topic with keynote speaker Susanne Åkerfeldt, Senior Adviser at the Ministry of Finance, whose knowledge on these issues arguably exceeds anyone within the Government Offices of Sweden. After graduating in June the author will start as a junior lawyer at the Swedish Competition Authority.

65 – MOTOR VEHICLE FUEL TAX IN INDONESIA: GREENING THE ENVIRONMENT THROUGH THE TAX

Hari Prasetyo and Ansari Jowen Salim

Although the motor vehicle fuel tax has been long implemented in Indonesia, the regulating laws blow hot and cold on its purpose. The Government Regulation Number 46 Year 2017 (Government Regulation No. 46/2017) concerning Environmental Economic Instruments explicitly states that the motor vehicle tax is an environmental tax, but offers no further explanation regarding the tax itself. However, according to The Act Number 28 Year 2009 concerning Local Taxes and Charges (Act No. 28/2009), motor vehicle fuel is subject to a local or regional tax. Furthermore, Act No. 28/2009 also states that the tax rate should not exceed 10 % of the fuel's base price, but without any environmental consideration nor any purpose of reducing its use. Generally, according to Act No. 28/2009, local taxes have revenue-raising purpose. This means that the fuel tax is subject to regional autonomy, and has a revenue-raising purpose. That being said, with the enactment of Government Regulation No. 46/2017, the law is paving the way for motor vehicle fuel tax with environmental purpose by recognizing the power of tax to control motor fuel consumption.

This paper presents the underlying problems why the motor vehicle fuel tax has never been correlated to address the environmental harms burning of fossil fuels causes. First, Act No. 28/2009 regards the motor vehicle fuel tax as a revenue-raising tax for provincial budget. Second, because of the investment-driven nature of Act No. 28/2009, the motor fuel tax does not correlate to rates high enough to give disincentives. Third, the motor vehicle fuel tax cannot work individually to address emissions problems, other policies are also needed in order to fulfill the sustainable development goals.

Key words:

Motor vehicle fuel tax, Local taxes, Environmental tax, Sustainable development, Revenue-raising tax.

Biographical Note

Hari Prasetyo, S.H., M.H. is a full time lecturer in Faculty of Law, University of Indonesia. He teaches several subjects, such as Environmental Law, Tax Law, and Administrative Law. He is also an active researcher in the Center for Law and Good Governance Studies in Faculty of Law, University of Indonesia. Several of his works include the paper titled "*In Dubio Pro Natura* as a Principle in Indonesian Climate Litigation, Future and Challenges at Imagining a Different Future: Overcoming Barriers of Climate Justice" which was presented on February 2018 at University of Tasmania, and the poster "Optimizing Environmental Tax to Mitigate the Climate Change: a Study of Indonesian Motor Fuel Tax (PBBKB) to Reduce CO₂ Emission" which was presented at the 2018 IUCN Academy of Environmental Law Colloquium, Strathclyde University, Glasgow.

66 – POLICY-MAKING TOWARDS SUSTAINABLE URBAN MOBILITY IN THE CZECH REPUBLIC: WHAT IS THE REALITY?

Hana Brůhová Foltýnová and Radomíra Jordová

Urban mobility significantly influences the quality of life in cities and sustainability of urban areas. To support sustainable mobility, cities in the Czech Republic should prepare Sustainable Urban Mobility Plans (SUMP) as their main transport strategic documents. Nowadays the first generation of SUMP have been finished.

Monitoring and evaluation constitute an important phase of SUMP preparation and implementation. However, these activities are often underestimated or even ignored by cities in praxis. In the paper, we ask how cities make decisions on mobility measures and policies, monitoring and evaluation of their impacts, where possible gaps are and how research can help cities to improve the situation.

The data for our survey were collected using an electronic questionnaire. The survey took place during January and February 2019 among heads of relevant departments of Czech municipal offices. All together we collected 70 questionnaires from more than 50 cities. Furthermore we conducted 50 interviews with key stakeholders in the field of urban mobility in the Czech Republic. Although the data show that cities have focused on the transport sector in their strategic documents, the process and impact of these strategies is regularly evaluated by only 1/3 of cities every 5 years in average, mostly using indicators settled in their action plans and monitoring only a few main indicators.

In our research we inquired what data cities regularly collect and how they communicate with their inhabitants when formulating and applying sustainable mobility policies and measures. The cities' representatives further identified the most efficient and recommendable urban mobility measures implemented during the last 20 years in their cities. The main transport-related problems in cities and the main barriers of monitoring and evaluation were analysed as well.

Czech cities still do not pay so much attention to monitoring and evaluation of mobility measures and policies; it is recommendable to further monitor if this praxis will be improved thanks to implementation of the first generation of SUMP.

Key words:

Urban mobility; Monitoring and evaluation; Policy-making of cities; Sustainable urban mobility plan

Biographical note

Hana Brůhová Foltýnová works as a senior researcher at the Faculty of Social and Economic Studies of Jan Evangelista Purkyně University in Usti nad Labem, the Czech Republic. She is concerned in sustainable urban mobility, above all in economic and environmental impacts of transport regulation, sustainable transport policies and measures and their monitoring and evaluation, and active transport support.

She has coordinated or has been a member of international and national research teams on a range of research and policy-oriented projects funded by various European R&D projects, Czech national grant bodies, the CERGE-EI Foundation under a program of the Global Development Network and EU operation funds, among others. Hana is an author of a monograph 'Transportation and the Society' (published in 2009 at Karolinum), and of a range of scientific publications and promotion of research results.

67 – ESG AS AN INSTRUMENT TO ACHIEVE NATIONAL AND INTERNATIONAL CARBON EMISSION REDUCTION TARGETS IN BRAZIL

Adriana Reis de Albuquerque, Denise Lucena Cavalcante & Eric de Moraes e Dantas

This paper aims to analyse how the use of ESG - Environmental, Social and Governance Criteria - by public and private investors can help to achieve national and international carbon emission reduction targets in Brazil. ESG is understood as the establishment by investors of minimum standards in environmental, social and governance areas to be fulfilled by the companies in which they decide to invest, in order to reduce the "investment risk" of these actors, avoiding that they subsidize, in regard to the element "Environment", activities of companies that promote environmental degradation. Once established their ESG criteria, investors can formulate their respective investment policies, prioritizing the financing of activities considered environmentally and socially responsible. From the investors' perspective, ESG utilization ensures the constant identification of the weakness / strength of the investments in terms of the risks to which they are exposed, especially with regard to the image / reputation element of these actors, concerned to avoid any kind of link with companies involved in ESG controversies, at the same time as it also allows them to constantly change their previously options, accomplishment and with environmental protection standards in general, as well as with the standards related to human rights and governance accomplishment. From the point of view of the companies to be financed, the ESG instrument use intensification by public and private investors imposes the need for a growing concern with compliance with national and international standards, leading to a systemic gain. However, although it can be used by foundations, pension funds and private companies, the ESG is still a little used instrument in Brazil, especially in the field of which the treatment policy of the environmental issue is mainly focused: on the tax question *stricto sensu*, through tax incentives. There is little analysis about the financial element importance and its potential as an instrument for environmental standards achievement. Considering this shortcoming, this article proposes to analyze what currently exists in terms of ESG in Brazil, especially in the scope of the Public Sector, seeking to punctuate its still incipient use, and its importance as a complementary tool to the policy of fiscal incentives.

Key words:

Environmental, Social and Governance Criteria, Carbon Emission Reduction Targets, Environmental Taxation, ESG instruments, Tax Incentives

Biographical note

Adriana Reis de Albuquerque: Attorney of the Treasury, since October 2005. PhD student in Law at UFC (Federal University of Ceará). Master in Public Law (sub-area Tax Law) by UFPE (Federal University of Pernambuco). Specialist in Tax Law by IBET (Brazilian Institute of Tax Studies).

Denise Lucena Cavalcante: Post-Doctorate in Law from the Faculty of Law of Lisbon - Portugal (2012). PhD in Law from Pontifícia Universidade Católica de São Paulo (2002). Master in Law from UFC (1993). Head Professor, Federal University of Ceará; Leader of the Research Group Environmental Taxation.

Eric de Moraes e Dantas: Master in Law by the Federal University of Ceará with scholarship provided by CAPES (2011-2013). Doctorate in law from UFC (Federal University of Ceará). Researcher Member of the Environmental Taxation Research Group, certified by the Federal University of Ceará, since 2007.

68 – STRANDED ASSETS AND COMPETITIVE PRICING FOR REGULATED UTILITIES: A FEDERAL TAX SOLUTION

Tracey M. Roberts

Stranded assets are capitalized expenditures for business assets, the costs of which can no longer be recovered when changes in markets, technology, or regulations force the assets' premature retirement. While unregulated firms may contain their risk by diversifying assets and income streams, procuring insurance or engaging in hedging transactions, regulators generally bar public utilities from taking these actions. News media and accounting, insurance, and academic articles report that over \$20 trillion in fossil fuel assets may be stranded if greenhouse gas emissions are regulated. In this context, stranded asset concerns have formed the basis for delays in the adoption of carbon pricing schemes, the rejection of carbon regulation altogether, bankruptcy filings, takings litigation, and investor demands for relief. This article makes four contributions. First, it quantifies the extent of stranded assets held by public utilities in the United States, pulling data from the securities filings of the fifteen largest firms to clarify the extent of their unrecovered capital. Second, it argues that U.S. tax measures have left fewer assets to be stranded, identifying "accumulated deferred income taxes" or "ADIT," the tax savings from deferral, as a source of recovery. Third, the article critiques existing tax and regulatory rules that require the economic returns from deferral to be passed forward to consumers, resulting in discounts in electricity rates, encouraging waste, and exacerbating negative externalities. Finally, the article proposes a change in tax and regulatory policy that will enhance efficiency, manage the threat of stranded assets when greenhouse gas legislation is passed, and smooth the transition to a carbon-neutral economy.

Key words:

Regulated public utilities, Stranded assets, Transition costs, Cost recovery, Tax deferral

Biographical note

Samford University, Cumberland School of Law Assistant Professor Tracey Roberts teaches and writes in the areas of taxation, property, and environmental law. Professor Roberts uses historical research, economic analysis, and tax policy and public finance tools to examine tax structures, environmental and land use regulation, and private governance systems. Her most recent articles have been published in the Northwestern University Law Review, the Washington and Lee Law Review, the University of California, Berkeley Ecology Law Quarterly, the Columbia Journal of Environmental Law. Her book, *Tax Law and the Environment*, co-authored with Roberta Mann was published in 2018. She received her LL.M. in Taxation from New York University, her J.D. from Vanderbilt University Law School, and her A.B. from Harvard University.

69 – “IF THE GOVERNMENT WON’T TAX OUR CARBON EMISSIONS, WE’LL DO IT OURSELVES”: POTENTIAL AND LIMITATIONS OF INTERNAL CARBON PRICING

Kris Bachus

An analysis of the upward trend in carbon pricing in recent years shows that most of the new initiatives are cap-and-trade instruments, while carbon taxes remain a niche climate policy instrument. A global carbon tax is unlikely in the near future, and national governments are reluctant to implement a carbon tax for reasons of carbon leakage and public aversion. Meanwhile, more and more multinational companies, including energy-intensive industries such as E.on, Exxon and Shell, are calling governments to choose the option of a carbon tax as an important part of their climate mitigation policy mix.

As progress at the government level is slow, many companies have taken matters into their own hands, by implementing *internal carbon pricing* (ICP) in their investment and operations decisions. An ICP places a monetary value (mostly between €5 and €100) on their greenhouse gas emissions, which businesses can then factor into investment decisions and business operations. In 2018, 1,400 companies were already using ICP, including Unilever, Microsoft, Solvay and PwC.

In this paper, the concept and the use of internal carbon trading will be explored and discussed. Six specific topics related to ICP will be tackled. First, the conceptual background will be supplemented by the development of a typology of ICP instruments. Second, the motivation of companies to implement ICP will be addressed. Third, the impact of ICP will be explored, both on the company level and on the macro level. Fourth, several cases of the use of ICP in companies in practice will be described and analyzed. These data will provide input for the fifth section, which will make an overview of the merits and weaknesses of internal carbon pricing. In the sixth section, a discussion on the potential of this carbon pricing instrument for the private sector will be engaged, including the question of the complementarity with climate policy mixes implemented on the government level.

Key words:

Internal carbon pricing, Carbon tax, Policy mix, Internalization of externalities

Biographical note

Kris Bachus is a research manager at the KU Leuven University. He leads a research team that executes policy-oriented research on environment-related themes. He did a PhD on the use of environmental taxation as a policy instrument. He also holds a master’s degree in applied economics and one in labour science. He has 20 years of experience in studies on environmental fiscal reform, sustainability of subsidies, circular economy, air pollution, sustainability transitions governance, green jobs, and climate finance. He is co-ordinator of the H2020 project ‘Pop-Machina’ on the maker movement and the collaborative economy.

70 – TOWARDS LOW-CARBON DEVELOPMENT: IMPLEMENTING A CARBON PRICING IN PERÚ

Carlos Trinidad Alvarado and Ernesto Ortiz Del Aguila

The main environmental problem in Peru is the use of land, land use change and forestry (LULUCF). According to Climate Watch Data, to 2014, greenhouse gas emissions (GHGE) from LUCUCF accounted for 64% of total Peruvian emissions. However, the GHGE from the energy sector (energy generation and transport) have grown around 232% in the last 20 years and currently represent 27% of the total. As can be seen, in a broader sense, the Peruvian GHGE are produced by the deforestation of the Amazonian biome, whose main causes are the following activities: intensive forest cut down, mining, agriculture and road infrastructure. These activities have place outside the legal system and have been confronted by the Peruvian State through traditional policies instruments (sanctions, fines, and punitive mechanisms), without greater effectiveness.

Furthermore, the environmental agencies responsible for dealing with deforestation face serious financing problems limiting their functions. For instance, the national parks conservation public system (SINANPE, by its initials in Spanish) has a financial gap of USD 18 million per year, which does not include the regional, local and communal conservation systems financing needs. Even more, there is no financial instrument, public or private, that allows the indigenous people to be adequately compensated for the positive environmental externalities generated from the conservation of their ancestral territories and that, in turn, can be an effective incentive to face deforestation and poverty.

This research proposes an innovative economic tool of high impact and efficiency: a carbon pricing (CP). In that sense, we develop a regulatory impact assessment regarding the CP implementation in Peru, through the following activities: (i) to identify the logic framework of the problems and environmental public policy goals, (ii) to identify the best regulatory option, based a cost benefit analysis, (iii) to evaluate the enable conditions for a CP implementation in Peru (iv) to identify the CP international performance. This study, the first of its kind in Peru, seeks to address the problem of climate change from different perspectives: evolve from a traditional approach based on sanctions towards economic incentives, strengthening the Amazonian long-term conservation finance and achieving a compensatory public policy to cover the basic public services for indigenous people.

Key words:

LULUCF, Carbon pricing, Climate change, Deforestation, Conservation, Economic incentives, Indigenous people

Biographical note

Carlos Trinidad has postgraduate studies in Law and Economics (University of Chicago), Sustainable Environmental Management (University of California, Berkeley) and regulatory impact analysis (University of Pacifico, Peru). He is currently working on sustainable investment issues at the Peruvian Society of Environmental Law (SPDA).

Ernesto Ortiz has a Master in Environmental Management at the University of Los Andes (Colombia) and Economics with a minor in social responsibility management from the San Ignacio de Loyola University. He has experience as a consultant in the application and research of economic and financial instruments for environmental conservation for Colombia and Peru, and management & development of green economy projects, currently working on sustainable investment issues at the Peruvian Society of Environmental Law.

71 – WHAT IS THE LOWEST POSSIBLE COST FOR COMPLYING WITH THE BIODIVERSITY TARGET IN SWEDISH FORESTS – AND WHAT IS THE VALUE OF CLIMATE BENEFITS?

Magnus Nilsson

In 1998 the Swedish Riksdag adopted 15 (later 16) long-term, environmental quality objectives. ‘Sustainable forests’ (*Levande skogar*) is one: “*The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.*” Evaluations have concluded a long way is still to go before the objective will be achieved. It is even unclear whether things are moving in the right direction.

Research shows that at least 20 per cent of the biotopes in a forest need to remain unaffected state if the environmental quality objective is to be achieved. At least half (8-16 per cent, depending of Swedish region) require protection of sufficiently large, representative and well-connected areas in nature reserves. Additional protection can be achieved by adapting forestry in managed areas.

For 8–16 per cent as nature reserves to be sufficient, protected areas have to be well-chosen, sufficiently large and sufficiently well-connected. The adaptation on managed areas has to be sufficiently extensive and of adequate quality. If any factor fails, larger areas need to be permanently protected in reserves.

From a conservation point of view, the choice between stronger adaptation on managed areas, or larger areas in reserves is of minor importance. In contrast, that choice will strongly affect the amounts of timber available for extraction, thus the socio-economic cost.

It is estimated that the loss of extractable timber can be limited to 20 million m³ per year (equalling 17.5 per cent of annual growth) if the need to establish nature reserves is limited to 8–16 per cent of the productive (growth above 1 m³/ha/yr) forested area.

Expressed as net present value of a persistent, stable annual net revenue, this corresponds to a socio-economic cost of SEK 120– 200 billion.

A side-effect of achieving the forest environmental quality objective is that large amounts of carbon dioxide will permanently be stored in the forest. Over a longer period (>100 years) an estimated 1.2–1.3 billion tons of CO₂ will be permanently accumulated. The socio-economic value of this is at least equivalent to the cost of the unavoidable loss of wood harvest potential. Thus, it seems possible to achieve the environmental quality objective of ‘Sustainable forests’ (*Levande skogar*) at a low or even negative socio-economic cost.

Key words:

Biodiversity, Socio-economic costs, Forestry, Climate

Biographical note

Magnus Nilsson has a background in environmental activism and journalism. Since 10 years he works as an independent consultant and researcher, specialised in the fields of European climate policy, transport, nature conservation and forestry. Nilsson has been a long-standing member of the board of Green Budget Europe and T&E, The European Federation for Transport and Environment. The presentation is based on the study “Skydda lagom”, made 2018 for ESO, the Swedish Expert Group on Public Economics, a think-tank linked to the Swedish Ministry of Finance.

72 – GLOBAL WARMING POLICY AND LOCAL ENVIRONMENT TAXES FOR REALIZATION OF LOW CARBON SOCIETY

Shoko Sakai

For effective measures against global warming given the current demand to shift to a low carbon society and for policy measures that will simultaneously achieve the twin policy goals of environmental conservation and economic development, we must implement a policy mix that uses economic means by combining economic means with other policy means including autonomous means and regulatory means. Economic means, which are premised on market mechanisms, use economic incentives including tax treatment and subsidies to induce behaviours in each actor, such as curbing of emissions, as a result of rational economic decisions, and it is anticipated that economic measures will provide effective economic support for global warming policy. In many European countries, there are already taxes on gasoline, coal, and natural gas, etc., and a carbon tax has been introduced in order to restrain emissions of CO₂ that result from consumption of the above fuels. In contrast, Japan has not yet introduced a carbon tax at the national level. In Japan, while debate continues on the usage of economic measures in the national environmental policy by introducing a carbon tax as a global warming policy or creating of an emission trading system, it is the local governments that are taking the lead in actual implementation of economic measures by introducing industrial waste taxes, forest and water source environment taxes, and so forth. At the local government level, prefectures are increasingly introducing independent forest and water source environment taxes for the purpose of forest development and water source environment conservation. This is occurring in a context where water issues are growing increasingly serious around the world and the world's forests continue to decrease and deteriorate; it has been pointed out that these phenomena are closely linked with the global warming problem, and so attention is being paid to the role filled by forests, as absorbers of CO₂, in the resolution of the global warming problem as well as to the public benefits provided by forests. This paper discusses about the development of forest and water resource environment taxes at the local government level in Japan.

Key words:

Environmental policy, Forest, Water source environmental tax, Participation tax system

Biographical note

Shoko Sakai was born in Japan. I'm an Associate Professor in Department of Management and economics at the Kaetsu University, Tokyo, Japan. Currently works on core tax and environmental tax systems in Japan with Japanese researcher and other researcher. My sculptures have been acquired by the modern tax system of United Kingdom, especially tax related about Japan and England.

73 – CURVES OF MARGINAL ABATEMENT COST OF STRATEGIES TO IMPROVE FEEDING IN DAIRY CATTLE FARMS: A CASE STUDY IN BRAZIL

Gabriela Mota da Cruz, Caio Monteiro and Sílvia Helena Galvão de Miranda

This paper aims to examine the potentiality of different types of feeding for dairy cattle in reducing its GHG emissions, simultaneously by enhancing the zootechnical indexes of farms and consequently the dairy productivity. The contribution of this kind of measure to environment might be either by reducing the absolute quantity of GHG emissions or in relative terms, by diminishing the intensity of emissions produced per liter of milk. In Brazil, there is a huge heterogeneity through dairy farms, in such a way that high technology and high productivity coexist, sometimes in the same region with poor technology and low productivity farms. The interest to relate economic goals in the dairy activity with the climate change ones is because the bovine sector ranks as one of the greatest emitters in Brazil. Most of these emissions come from the enteric fermentation that generates methane, but there is also a significant contribution from the manure production. The dairy cattle is the second largest emitter in the agriculture sector, according to the last inventories. In Brazil, agriculture ranks as second largest emitter after the Land Change and Land Change Use and Forest. Thus, we elaborate curves of Marginal Abatement Cost (MACC), adopting the technological approach, and based on the methodology applied by the World Bank. Regarding the costs of production of dairy farms, we used data collected by Cepea – USP, through a panel method, for modal dairy farms. The study case presented here relates to a typical dairy farm located in a region, where a technology and low technical efficiency prevail – Leopoldina, in Minas Gerais state. The typical farm database comprises detailed costs of production and zootechnical indexes, adopted as references for the baseline projection (for 13 years). Along this timeline, in the interest scenario of technology changes, the zootechnical coefficients and the costs modify, as the farm adopts the new optimal diet for cows. A pathway was defined for this scenario, according experts, allowing for adjustments in the animal stocking rate, milk productivity/cow, birth rate and lactation period, along the timeline. Besides these adjustments, costs of feeding also changes. Prices refer to 2018 base year. Preliminary results show that emissions produced from manure handling per liter of milk, dropped from 0,001481615Gg CH₄/year in the baseline to 0,0000443473 Gg CH₄/year in the scenario. This outcome highlights that improvements in feeding strategies lead to a relative decoupling in the modal dairy farm.

Key words:

GHG emissions, Production cost, Milk, Manure

Biographical note

Gabriela Mota da Cruz is a graduate student in Applied Economics at the University of São Paulo and has a degree in Economics from the Pontifical Catholic University of Campinas. She received a scholarship from Instituto Escolhas and currently from the Coordination for the Improvement of Higher Education Personnel (CAPES) to support this research.

74 – REDUCTION OF EMISSIONS, BIOFUELS, BIO AGRICULTURE: HOW TO COMBINE TAX EXEMPTIONS AND CIRCULAR ECONOMY

Carlo Soncini

The urgency of the reduction of emissions is one of the most important and debated issues at the moment in environmental law and, in particular, in environmental tax law. The alternative of fossil fuels is based at the moment on the possibility to use alternative fuels: electric and bio fuels and also methane gas. A large number of car producers has introduced electric or hybrid cars. Their diffusion is increasing greatly, thanks to tax exemptions and reductions. In Italy a tax has been recently introduced to dissuade to use older and more polluters cars, especially diesel.

In this paper we are going to investigate how to combine the use of biofuels and sustainable agriculture. In this context tax exemptions and tax reductions also in agriculture will play a very important role. The problem at least in the prospective of large use of biofuel is the compatibility between food agriculture and fuel agriculture. In a demographic increasing world is not possible to reduce food agriculture to increase fuel agriculture especially in the development countries. The same problem is also in so called industrial countries as Italy. In the prospective of wide diffusion of circular economy bio fuels should be produced with waste of agriculture productions and tax exemptions should allow to increase more and more these opportunities.

As told there are two kinds of environmental tax laws. On one side the introduction for older cars of taxation to improve the selling of new and low polluters cars. On the other side the introduction of reductions and exemptions is essential in this prospective in both these directions:

- 1 – Tax reductions and exemptions on biofuel;
- 2 – Tax reductions and exemptions on bio agriculture (both for increasing production of bio fuel and bio agriculture for human alimentation);
- 3 – Tax reductions and exemptions on circular economy connected with biofuel and bio agriculture
- 4 – Tax reductions and exemptions on a correct and sustainable land use.

As we can see there are wide possibilities of combinations of these legal instruments. First of all is indispensable a recognition of the European and national tax legislations in these fields. In this prospective is also essential the document of OECD: Council Recommendation on water. The use of water is essential to increase grow of human food products that is to be preferred to the production of raw materials for bio fuels in a demographic increasing world. Tax exemptions and reductions and also a special tax regime dedicated expressly to circular economy could play an essential role to improve sustainability.

Key words:

Air pollution, Sustainable transport system and vehicles, Energy production consumption, Land policies, Water policies, Sustainable food chains

Biographical note

Carlo Soncini is a Visiting Scholar at Boston College Law School and the President of the National and International Tax Commission of the Order of Chartered Accountants of Parma in Italy. In the recent past he served as Adjunct Professor of European Tax Law at the Department of Law of the University of Parma.

International Programme Committee

Professor Larry Kreiser, *Emeritus Member*, Cleveland State University, USA
Professor Janet Milne, Vermont Law School, USA
Associate Professor Hope Ashiabor, Macquarie University, Australia
Professor Mikael Skou Andersen, Aarhus University, Denmark
Susanne Åkerfeldt, Swedish Ministry of Finance, Sweden
Dr. Kris Bachus, KU Leuven, Belgium
Dr. Nils Axel Braathen, OECD Environment Directorate, France
Professor Bill Butcher, University of New South Wales, Australia
Associate Professor Nathalie Chalifour, University of Ottawa, Canada
Jacqueline Cottrell, Green Budget Europe, UK
Professor Mona Hymel, University of Arizona, USA
Professor Deborah L. Jarvie, University of Lethbridge, Canada
Dr. Joy Kim, United Nations Environment Programme
Professor Soocheol Lee, Meijo University, Japan
Professor Roberta Mann, University of Oregon, USA
Associate Professor Sven Rudolph, Kyoto University, Japan
Dr. Stefan Speck, European Environment Agency, Denmark
Professor Natalie Stoianoff, University of Technology Sydney, Australia
Professor Marta Villar, CEU San Pablo University, Spain
Professor Stefan Weishaar, University of Groningen, Netherlands
Associate Professor Yan Xu, The Chinese University of Hong Kong, Hong Kong
Professor Ana Yábar Sterling, Complutense University of Madrid, Spain
Eero Yrjö-Koskinen, Green Budget Europe, Belgium
Associate Professor Theodoros Zachariadis, Cyprus University of Technology

Local Scientific Committee

Associate Professor Theodoros Zachariadis (Conference Chair),
Dean of the Faculty of Geotechnical Sciences and Environmental Management,
Cyprus University of Technology
Associate Professor Costas Hadjiyiannis,
Department of Economics, University of Cyprus
Associate Professor George Kassinis,
Department of Business and Public Administration, University of Cyprus
Associate Professor Christos Savva,
Department of Commerce, Finance and Shipping, Cyprus University of Technology

Critical Issues in Environmental Taxation Publication

Participants at the 20th Global Conference on Environmental Taxation will have the opportunity to publish their research in Critical Issues in Environmental Taxation. The Call for Papers for Critical Issues will be sent approximately one month after the end of the Conference. Critical Issues is published annually by Edward Elgar Publishing Ltd. Edward Elgar has a strong publishing record in the fields of environmental economics, environmental law, and environmental taxation. Additional information on Edward Elgar and Critical Issues can be found at www.e-elgar.com. Each volume of Critical Issues is limited to approximately 100,000 words (16-19 manuscripts) and has a theme approach. The theme for each volume is determined after the manuscript review process is complete.

Manuscripts accepted for publication in Critical Issues deal with insights and analysis for achieving environmental goals through tax policy. They are reviewed by two external reviewers and should deal with topics that are timely and of regional, national, or international interest. Authors of accepted manuscripts will receive one copy of the publication. Final versions of manuscripts accepted for publication in Critical Issues should meet the following requirements:

Format. All manuscripts are limited to a maximum of 6,000 words including footnotes, tables, figures, etc. Each table will count as 300 words and each figure will count as 500 words. References are to be placed at the end of the manuscript as endnotes. All manuscripts must be double-spaced, including endnotes, using Microsoft Word format (Times New Roman 11).

English. The manuscript must be written in clear, fluent English so that readers will not be able to distinguish authors who use English as a first language from those who use English as a second language. The editors of Critical Issues encourage any authors who are not fluent in English to engage their own editors who can help them to meet this standard for the final manuscript.

Abstract. If the manuscript starts with an abstract, the abstract should be eliminated from the manuscript prior to submission for possible publication.

Author Credentials. An endnote following the name(s) of author(s) should indicate the author affiliation (without abbreviations) and email address.

Copyright. The author(s) must be the sole owner(s) of the complete copyright and all other rights in the manuscript (apart from copyright material not owned by the author but included in the manuscript with the permission of the copyright holders). Authors have the responsibility for obtaining any necessary copyright permissions.

Exclusive Publication. The author(s) of accepted manuscripts must not have published the manuscript previously in another publication and should not publish the manuscript in any other publication without the express permission of the editors of Critical Issues.

Publisher Requirements. The author(s) of accepted manuscripts must respond to the editors promptly when receiving requests to review proofs and sign publication agreements.

Index of Participants

Name	First Name	Institution/Organisation	Country	Session
Åkerfeldt	Susanne	Swedish Ministry of Finance	Sweden	1.1
Andersen	Mikael Skou	Aarhus University	Denmark	1.4
Ashiabor	Hope	Macquarie University	Australia	3.3
Bachus	Kris	KU Leuven	Belgium	4.4
Belletti	Elena	Columbia University	United States	2.4
Bisogno	Marina	University of Naples Federico II	Italy	2.3
Bladon	Annabelle	International Institute for Environment and Development	United Kingdom	4.2
Bruhova Foltynova	Hana	Jan Evangelista Purkyně University	Czech Republic	4.3
Butcher	Cyril	University of New South Wales	Australia	1.1, 2.4
Cairns	Robert	McGill University	Canada	1.5
Cámara Barroso	María del Carmen	Madrid Open University (UDIMA)	Spain	3.1
Cañal	Francisco	Universidad de Barcelona	Spain	1.2
Cavalcante	Denise Lucena	Universidade Federal do Ceará / PGFN	Brazil	4.1,4.2,4.4
Cheng	Selina	UNSW Australia	Australia	1.1
Charalambous	Anthi	Federation of Employers and Industrialists	Cyprus	-
Chrysostomou	Andreas	Tototheo Maritime	Cyprus	Panel 2
Cottrell	Jacqueline	Green Budget Europe	United Kingdom	3.3
De Perthuis	Christian	Paris-Dauphine University	France	Panel 1
Di Cosmo	Valeria	University of Torino	Italy	2.1
Ekins	Paul	University College London	United Kingdom	Keynote
Elnaboulsi	Jihad	CRESE, Université de Bourgogne Franche-Comté	France	3.4
Esteve Pardo	Maria Luisa	Universitat de Girona	Spain	3.1
Fazekas	Dóra	Cambridge Econometrics	Hungary	2.3
Gao	Ping	Central University of Finance and Economics	China	3.2
Ge	Chazhong	Chinese Academy of Environmental Planning	China	1.3
Geringer	Stefanie	University of Vienna	Austria	2.1

Name	First Name	Institution/Organisation	Country	Session
Giannakis	Elias	The Cyprus Institute	Cyprus	3.4
Gren	Marc	Ministry of Finance, Sweden	Sweden	-
Hadjiyiannis	Costas	University of Cyprus	Cyprus	-
Hasan	Dahlia	Law Faculty Universitas Gadjah Mada	Indonesia	3.3
Hatzipanayotou	Panos	Athens University of Economics and Business	Greece	1.5, 3.4
Herisna	Era	Ministry of Finance of Republic of Indonesia	Indonesia	-
Hiort af Ornäs Leijon	Lena	Swedish Tax Agency	Sweden	-
Hymel	Mona	University of Arizona Law	United States	3.2
Iliopoulos	Theodoros	Hasselt University	Belgium	3.1
Jarvie	Deborah	University of Lethbridge	Canada	1.3
Katranis	Philippos	Water Board of Lemesos	Cyprus	-
Kawakatsu	Takeshi	Kyoto Prefectural University	Japan	4.1
Kettner-Marx	Claudia	Austrian Institute of Economic Research (WIFO)	Austria	3.3, 4.1
Kichigin	Nikolay	Institute of legislation and comparative law under the Government of the Russian Federation	Russia	-
Kim	Joy Aeree	UN Environment	France	-
Kiula	Olga	University of Warsaw	Poland	1.4
Kletzan-Slamanig	Daniela	Austrian Institute of Economic Research (WIFO)	Austria	3.3
Kordatos	Charis	Cyprus Energy Agency	Cyprus	1.3
Kulmer	Veronika	Joanneum Research	Austria	1.4
Labandeira	Xavier	University of Vigo	Spain	1.2
Lago Montero	Jose Maria	Spain	Spain	-
Laprovitera Rocha	Sofia	Universidade FEDERAL DO CEARA	Brazil	3.1
Long	Feng	Chinese Academy of Environmental Planning	China	1.3
Makri	Rena	Ministry of Finance	Cyprus	-
Mann	Roberta	University of Oregon School of Law	United States	2.3
Mariani	Antonio	Banca d' Italia	Italy	-
Matsas	Andreas	Cyprus Workers' Confederation (SEK)	Cyprus	Panel 3
Merayo Garcia	Eugenia	International Institute for Environment and Development	United Kingdom	3.3

Name	First Name	Institution/Organisation	Country	Session
Meyer	Ina	Austrian Institute of Economic Research – WIFO	Austria	3.4
Michael	Michael	University of Cyprus	Cyprus	1.5, 3.4
Milne	Janet	Environmental Tax Policy Institute, Vermont Law School	United States	1.1
Misra	Kaumudi	Institute for Social and Economic Change	India	2.4
Mota da Cruz	Gabriela	Universidade São Paulo	Brazil	4.5
Nilsson	Magnus	Magnus Nilsson Produktion	Sweden	4.5
Prasetyo	Hari	Faculty of Law, Universitas Indonesia	Indonesia	2.1, 4.3
Purwito Hadi	Mas	Fiscal Policy Agency of Republic of Indonesia	Indonesia	-
Roberts	Tracey	Samford University, Cumberland School of Law	United States	4.4
Rudolph	Sven	Kyoto University	Japan	1.3, 4.1
Sakai	Shoko	Kaetsu University	Japan	4.5
Salim	Ansari Jowen	University of Indonesia	Indonesia	2.1
Savva	Christos	Cyprus University of Technology	Cyprus	-
Sawada	Eiji	Kyushu Sangyo University	Japan	1.5
Schiebe	Torbjörn	Lund University	Sweden	4.3
Schneider	Tamara	Doshisha University	Japan	1.3
Shah	Rajiv	T A Pai Management Institute	India	2.4
Skovgaard	Jakob	Lund University	Sweden	4.1
Smith	Tristan	University College London	United Kingdom	Panel 2
Sotiriou	Chryso	Cyprus University of Technology	Cyprus	1.4
Speck	Stefan	European Environment Agency	Denmark	3.2
Steckel	Jan	Mercator Research Institute on Global Commons and Climate Change	Germany	Panel 3
Steenkamp	Lee-Ann	University of Stellenbosch Business School	South Africa	1.4
Stephanides	Marios	Ministry of Finance	Cyprus	-
Stoianoff	Natalie	University of Technology Sydney	Australia	1.1, 3.2
Syaifudin	Noor	Ministry of Finance of Republic of Indonesia	Indonesia	-
Symeonidou	Nayia	Ministry of Finance of Cyprus	Cyprus	-
Theeuwes	Anna	Shell International BV	Netherlands	-
Tomo	Alessia	University of Naples Parthenope	Italy	4.3

Name	First Name	Institution/Organisation	Country	Session
Tsakiris	Nikos	University of Ioannina	Greece	1.5, 3.4
Tsur	Yacov	Hebrew University of Jerusalem	Israel	Keynote & Panel 3
Tumpel	Julia	University of Vienna	Austria	2.2
Van Dender	Kurt	Organisation for Economic Cooperation & Development	France	Panel 3
Vanrykel	Fanny	University of Liège	Belgium	2.1
Villar	Marta	CEU San Pablo University	Spain	3.1
Vlassis	Nikolaos	Aberdeen University	United Kingdom	1.5
Waldruff	Anja	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Germany	-
Weishaar	Stefan E.	University of Groningen	Netherlands	1.1
Westman	Linnea	Swedish Ministry of Finance	Sweden	2.2
Wu	Jian	Renmin University of China	China	2.4
Zachariadis	Theodoros	Cyprus University of Technology	Cyprus	1.4
Zanocchi	Jose Maria	Federal University of Cear�, Brazil	Brazil	1.2
Zatti	Andrea	University of Pavia	Italy	4.2
Zhang	Xiaoping	Central University of Finance and Economics	China	2.4

GCET20

20th Global Conference on Environmental Taxation
25-28 September 2019, Limassol, Cyprus



Cyprus
University of
Technology

Sponsors & Supporters



Conference Management Company:



#gcet20