

# Bocconi



Università Commerciale  
Luigi Bocconi

## IEFE Annual Report 2011



IEFE  
Annual Report  
2011



## Preface

Dear Reader,

2011 was a busy year at IEFE. During the second year of implementation of the new 2010-2012 Research Plan, various research projects were completed and new ones were initiated. Some of these projects were included in the Research Plan, others were not.

Research on global energy markets looked at the development of the renewable energy supply on the electric systems under various perspectives: monitoring best practices in the European Union concerning policies implemented by member countries, and analyzing the impact of RES investment on industrial sectors. Several topics in the evolution of energy markets have been studied, including the mechanism to allocate storage capacity and public service obligations and the development of gas hubs. Climate and Energy Policies were analyzed both at the national and supranational level as well as from the point of view of local administrations and firms. Among the topics studied, we can mention the impact of emission reduction and energy efficiency targets on industrial investment and innovations, local policies at the urban level to mitigate GHG emissions. Modeling efforts able to simulate the sectoral, as well as regional effects of climate change impact and climate policies continued with an additional, fresh perspective: the implications of carbon pricing and support to renewables for the public accounts of European Member States. Compliance with environmental programs by the EC within the Life+ Programme was also analyzed. In the macro-subject on Regulation of Liberalized Markets we studied the issues involved in energy storage for the reliability of electric systems with large renewable supply, the simulation of transport infrastructures upgrades on gas and electricity systems, and an assessment of the impact of the reform of the water industry on investment, prices and stakeholders.

IEFE activity in 2011 also consisted of organizing the meetings of its three Observatories, which provide an opportunity for policy-makers, researchers and industry operators to discuss issues that are relevant in the current debate surrounding energy markets and environmental policies. In addition to that, IEFE continued its collaboration with EnergyLab, a research foundation founded in Milan in September 2007 with the goal of creating a network between universities, the business world and regional and local government to support research, development and innovation and to promote awareness of energy-related matters among the public, government institutions, private bodies and the media. Moreover, in 2011 IEFE developed its cooperation with Brussels-based CERRE, the Centre on Regulation in Europe.

*The output of IEFE research activity, as in the past, has found its way to several outlets, from numerous seminars and meetings to working papers and the recently added research reports line, and eventually to publications in books and scholarly journals*

*In 2011 several changes occurred in the group of researchers at IEFE, both outgoing and incoming. Clara Poletti, who served as Director since 2007, left in October 2011 moving back to the Italian Regulatory Authority AEEG. During these years Clara did an excellent job, stimulating new lines of research, improving the internal rules, promoting new hirings and developing important networking with other international Research Centers in Energy and Environment. I would like to thank Clara, on behalf of IEFE and Università Bocconi, for her contribution, and I hope that she will continue to be a fundamental reference for the IEFE researchers in her new position at the AEEG. I was appointed as new Director of IEFE in November 2011: I chaired the committee that prepared the plan for a new development of IEFE in 2006-07 while I was heading the Department of Economics, and then I followed IEFE's evolution at arm's length in the following years, when I was Vice Rector of Bocconi. Now it is time for me to take on responsibility closer to the development of the Center, and, with my appointment, Università Bocconi is confirming its strong commitment to continue the policies implemented in recent years. Starting in November 2011 Caterina Miriello, PhD at IMT Lucca and visiting scholar at the Energy Markets Group, LBS, joined IEFE with a Post-doc position. Finally, in November 2011 the Università Bocconi Department of Economics appointed Valentina Bosetti as Associate Professor, who is head at the Fondazione Mattei, the group of climate change. Valentina, who will start her new job in September 2012, will join IEFE and contribute to the further developments of our group on environment and climate change. We warmly welcome Valentina.*



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## 1. Introduction

The Center for Research on Energy and Environmental Economics and Policy (Istituto di Economia e Politica dell'Energia e dell'Ambiente - IEFE) is the Università Bocconi research center which co-ordinates and conducts applied research in the following fields:

- a) Energy economics, focusing on energy markets as well as on natural resources
- b) Environmental economics, focusing both on environmental policy and environmental management and sustainability concerning private companies and public agencies
- c) Economics of public utilities focusing on energy, water and waste

This report summarizes the research activity carried out by IEFE in 2011.

## 2. IEFE Research Activity

The description of IEFE research activity in 2010 for both completed and ongoing projects is organized according to macro-subjects. These were presented in the IEFE Three-Year Research Plan (RP3) 2010-2012, which identified the guidelines as well as the resources required to implement them. The RP3 for the period 2010-2012 was approved by the Steering Committee on 18 November 2010 and is available on the IEFE website at [www.iefef.unibocconi.it](http://www.iefef.unibocconi.it).

The three macro-subjects of the RP3 2010-2012 are:

- RP3/1 Towards global energy markets
- RP3/2 Integrated climate and energy policies
- RP3/3 The role played by regulation in liberalized sectors

The table below presents the research projects that were planned at the beginning of the three-year period, together with the relevance for the three macro-subjects. The one below is not an exclusive list of IEFE research activity in the planning period.

Research Projects	Macro-subjects		
	RP3/1	RP3/2	RP3/3
	Towards Global Energy Markets	Climate and Energy Policies	Regulation of Liberalized Markets
ECCELSA - Environmental Compliance based on Cluster Experiences and Local SME-Oriented Approaches			
ENCLIMOD – Computable General Equilibrium Modeling of the Effects of Climate and Energy Policies			
RE-SHAPING			
A National Strategy for Energy and Climate			
Determinants of Innovation in Energy Technologies			
Growth, Population, and the Environment			
Oil Price Shocks, Stabilization Policies and Economic Growth in Oil-Exporting Countries			

Please note: the boxes shown in orange indicate the importance of each research project for each RP3 macro-subject. The shade of orange indicates the level of relevance from the least relevant (white) to the most relevant (dark orange).

Research Projects	Macro-subjects		
	RP3/1	RP3/2	RP3/3
	Towards Global Energy Markets	Climate and Energy Policies	Regulation of Liberalized Markets
Sustainable Mobility			
The Contribution of Domestic Measures for Achieving GHG Reduction Objectives in the EU Context and the Role of Local Authorities			
The Quest for Gas: Future Scenarios			
Vertical Integration and Retail Competition Under Environmental Regulation			

Please note: the boxes shown in orange indicate the importance of each research project for each RP3 macro-subject. The shade of orange indicates the level of relevance from the least relevant (white) to the most relevant (dark orange).

Below we provide a short description of the research projects that were completed or were ongoing in 2011. Some of these projects were included in the Research Plan 2010-2012, others were new and additional.

### RP3/1 – Towards Global Energy Markets

#### **RE-SHAPING - Shaping an Effective and Efficient European Renewable Energy Market**

Research Director: Arturo Lorenzoni

Research Team: Niccolò Cusumano, Giacomo Selmi

Timing: 2009–2011

The overall aim of the RE-SHAPING project is to develop sound policy recommendations and policy implementation strategies for RES market penetration in all 27 EU member states after the 2020 target of 20% of the final energy consumption from RES stated by Directive 2009/28/EC.

The research monitors the policies of the Member States in light of their target and identifies successful actions. IEFE's contribution was focused on flexibility mechanisms for achieving the target and on the investigation of the role of foreign investments.

The research team was coordinated by the Fraunhofer Institute – ISI and included some of the major European research groups in renewable energy economics and regulation.

#### **Renewable Energy Laboratory**

Research Director: Arturo Lorenzoni

Research Team: Niccolò Cusumano

Timing: 2011

In the frame of the EnergyLab laboratories, IEFE collaborated on the issue of the report on Renewable Energy Sources: state of the art, with responsibility on two

chapters, one on RES generating costs, the other on Industrial Capabilities In Lombardy for RES technologies. The work was carried on in collaboration with other Universities from Milan and was supported by a series of seminars held during 2011.

### **Analysis of the Environmental and Energetic Chains in the Province of Milan**

Research Director: Marco Frey

Research Team: Andrea Fontanella

Timing: 2010–2011

The first phase of the project aimed at supporting Assolombarda – the largest territorial association of the entire entrepreneurial system in the country – in analyzing sustainability chains within the Province of Milan. Starting from data collected from Assolombarda-associated firms, in 2010 the project led to a detailed analysis of enterprises working in environmental and energy sectors within the Province of Milan, with a focus on distribution of competences, roles, experiences and research and innovation activities. The survey brought to light a reality rich in enterprises and competences in sustainable sectors, with great opportunities for network creation, but currently very fragmented due to the small dimension of firms. During the project, enterprises operating in the same sector had the opportunity to meet with each other and to start working with Assolombarda to receive the necessary support to create networks and be competitive at the Italian, European and international levels.

In 2011, the Assolombarda Green Economy Network was activated, as a consequence of the interest shown by the enterprises for in sustainability topics during the survey and related activities.

The second phase of the project supported the Green Economy Network activities with specific seminars aimed at strengthening the mutual acquaintance of the enterprises and the valorization of related opportunities. In particular, seminars focused on green investment and funding opportunities in North America and the Balkans and energy efficiency chain yield, incentives and business opportunities.

### **Energy Markets**

Research Director: Clara Poletti

Research Team: Barry Anderson, Paolo Bertolotti, Monica Bonacina, Alberto Cavaliere, Anna Creti, Stefano De Michelis, Matteo Di Castelnuovo, Annalisa D’Orazio, Alberto Minarelli

Foreign Partner: Université de Montpellier-LAMETA (France)

Timing: 2010–2011

How is the impact of liberalization on energy security and environmental protection affected by the actual working of energy and complementary markets? Are current policy frameworks suitable to correct inefficiencies?

IEFE has led and coordinated an international team investigating (1) the consequences – as for productive, allocative and dynamic efficiency - of alternative rationing rules to allot scarce storage capacity; (2) the effectiveness of auction mechanisms for the provision of universal service obligations in liberalized markets; (3) the impact of alternative policy mixes power on emission abatement paths; and (4) the effects of liberalization on international gas markets’ bargaining powers. The project was run with the financial support of the Region of Lombardy. Some research papers have already been accepted and will be published in international journals.

## **The Development of Gas Hubs in Europe**

Research Director: Michele Polo

Research Team: Guido Cervigni, Caterina Miriello, Leen Dickx

Timing: 2011–2012

One of the most important issues in the liberalization of gas markets in Europe is the development of wholesale gas markets (gas hubs). Although quite heterogeneous in their degree of development, functions and interaction with the gas systems, gas hubs may represent a key tool to promoting competition in retail markets, but they also pose difficult questions in the equilibrium of the gas markets, still dominated upstream by long term contracts with take or pay obligations and prices indexed to oil. The research project aims to assess the development of gas hubs in the main European countries. The first phase of the project looks at gas wholesale markets as an additional tool for managing the balancing of the gas systems, describing the different tools for flexibility and balancing and the solutions prevailing in the main European markets. Secondly, we assess the role of gas hubs as a secondary source of spot gas in competition with long term contracts. Third, we analyze the main instruments to measure the degree of development of gas hubs, namely their liquidity (volumes, churn rate, measures of bid-ask spread) and how these measures apply to the main European hubs (NBP-UK, ZBH-B, TTF-N, PSV-I, PEGs-F, NCG-D). Finally, we consider the evolution of hub prices and the issue of decoupling from the oil price.

## **RP3/2 – Climate and Energy Policies**

### **Environmental Policies, Innovation Systems and Competitiveness of the Industrial Sector**

Research Director: Annalisa D'Orazio

Research Team: Enrico Botta, Annalisa D'Orazio

Timing: 2011–2012

The European Union's ambitious targets of a 20% reduction in greenhouse emissions and a 20% increase in energy efficiency by 2020 resulted in the creation of large technical and economic potentials. The industry can largely contribute to achieving these targets because of its huge possibilities of emissions reduction and improvement in energy efficiency, but this can only happen if the appropriate investments in clean technologies are made. Within this framework, these investments are likely not only to reduce the costs imposed by regulation on the industry but also to trigger important innovation effects within the clean tech sector. As such, the project aims to investigate the role that an innovation system constituted by the main relevant actors (suppliers of clean technologies, consumers of clean technologies, institutions and policymakers) can have in achieving the objectives of EU environmental energy policies more efficiently.

The first year of research focuses on the analysis of the technical and economic potentials appeared as necessary, because without the realization of these potentials the targets of the energy efficiency and environmental protection directives cannot be reached. The main focus of the project is to prepare the analytic basis for an in-depth discussion of economic energy efficiency and emissions abatement potentials in industrial energy uses. With this in mind the project has the following objectives: (i) a review of the European energy efficiency and emission reduction with relevant

impacts on large companies and SMEs and the quantification of constraints; (ii) the analysis of both the carbon and energy intensity of Italian industries and sectors; (iii) the estimate of technical and economic energy savings and emissions reduction potentials and the development of a tool to assess the industrial potentials that can be met most cost effectively.

The results, which are built on extensive datasets and ad-hoc developed models, are the criteria that will serve to identify and select sectors and companies (suppliers and consumers of new technologies and products) to test the innovation system model in the second phase of research.

### **ENCLIMOD - Environmental and Climate Modeling**

Research Director: Roberto Roson

Research Team: Marzio Galeotti, Martina Sartori

Foreign Partner: The World Bank (Washington D.C., USA)

Timing: 2009–2012

ENCLIMOD purports to develop a computational modeling platform to analyze various issues in the area of energy and climate policy at the Italian, European, as well as world levels. The project benefits from a partnership with the World Bank, where IEFE contributed to the development of ENVISAGE (Environmental Impact and Sustainability Applied General Equilibrium Model), a dynamic computable general equilibrium model of the world economy, which is paired with a numerical climate model aimed at carrying out Integrated Assessment Modeling exercises. More generally, the project aims to develop models and modeling capabilities in the field of Computable General Equilibrium models at IEFE. Models developed this way are all based on the GTAP (Global Trade Analysis Project) database and structure. In April 2011, an important conference on “General Equilibrium Modeling of Climate and Energy Impacts and Policies: Recent Developments” was organized at Università Bocconi. Two papers have been accepted for publication and should be published in 2012. A third paper is under development and will soon be presented at an international scientific conference. Members of the ENCLIMOD team have started applying general equilibrium modeling techniques in other projects of interest for IEFE, such as THINK and the European project WASSERMed. These works have materialized in other publications and presentations. The acquired modeling capability is now being taken into account in the formulation of new research proposals and fundraising activities.

### **ECCELSA – Environmental Compliance Based on Cluster Experiences and Local SME-Oriented Approaches**

Research Director: Michela Melis

Research Team: Michele Barberio, Andrea Fontanella

Timing: 2009–2011

ECCELSA was a project funded within the European Commission’s Life+ Programme aimed at supporting an effective application of the EC “ECAP – Environmental Compliance Action Plan”. It focuses on SMEs, as they represent 99% of all EU enterprises and, despite their small size, their contribution to environmental pollution is large. SME limits, in terms of human, technical and financial resources, often make it difficult to implement environmental compliance and environmental performance improvement related actions.

In such a context, the project was aimed at testing the so called “cluster approach” – based on the creation of SME networks, resource sharing, innovation development and knowledge exchange – as a means to increase local environmental skills and to improve environmental performances, both in companies and at an industrial area level.

Following the 2009 methodological finalization of the “cluster-based” strategic approach to ECAP and the 2010 identification of the main environmental priorities for action in each territorial clusters involved, the project activities in 2011 focused on the implementation of the actions designed for the clusters involved (Route Plan and Actions). More in detail, in each territorial cluster a series of activities in the following areas were carried out:

- Environmental compliance and energy auditing
- Training sessions on the environmental issues that firms identified as relevant for the cluster (e.g. waste management, energy, emissions)
- Elaboration and diffusion of guidelines and information documents on the best available techniques and technologies in the different fields of energy, emissions control, waste management, water management, etc.
- Circulation of a CD-ROM containing a check-list on environmental regulation aimed at supporting firms to reach and maintain the highest possible level of compliance with environmental regulation over time

In each cluster, the abovementioned set of activities was then complemented with a series of “tailor-made” actions, in accordance with each cluster’s environmental priorities.

Finally, once the actions had been carried out, a set of relevant, consistent, easy-to-use and effective Key Performance Indicators (Dashboard) were applied, both for the cluster and for the SMEs operating in it. Those indicators aim to measure the impacts of the cluster approach in terms of policy effectiveness (responsiveness to environmental priorities, active involvement of the relevant actors, targets achieved, environmental improvements by actors involved, etc.) and efficiency (costs of the policy, break-down of the policy-resource burden, etc.).

To complement the Route Plan and the Dashboard phases of the project, communication and dissemination activities were also assured.

ECCELSA Deliverables and Reports can be downloaded from the official website of the EU project: [www.eccelsalife.it](http://www.eccelsalife.it).

### **Determinants of GHG Emissions and Comparative Analysis of Mitigation Policies for Global Cities**

Research Director: Edoardo Croci

Research Team: Sabrina Melandri, Tania Molteni

Timing: 2009–2012

According to IEA’s estimates, cities are responsible for two-thirds of the world’s energy use and for more than 70% of CO<sub>2</sub> emissions. The contribution of individual cities to global emissions can be very different: values published in literature are in the range of 2 - 30 tCO<sub>2</sub>e per capita. Which policies have been put in place by cities to reduce GHG emissions at a local level? And which are the main determinants of differences in emissions between cities? These issues have been investigated by the research team in different steps.

Firstly, emissions inventories and mitigation policies of five global cities (London, New York City, Milan, Mexico City and Bangkok) have been analyzed

and compared. Results showed that all the five cities have defined a coherent strategy with their local emission contexts, as they focus mitigation measures on the most relevant sectors for their urban emissions (the building sector for cities from industrialized countries, transportation for cities from developing countries). This research phase has given rise to the publication of a chapter in the World Bank book: “Cities and climate change: responding to an urgent agenda”. Secondly, the sample of cities was expanded and determinants of urban emissions have been studied through a qualitative data analysis, which compared emissions values with a set of urban indicators (related to climate conditions, urban form, economic activities, state of technology, mobility and housing infrastructures, and income). The analysis focused on the housing sector and transport, the two most relevant contributors to urban emissions. Results showed that climate is a primary determinant of energy use in residential buildings. However, cities with similar climate conditions show different levels of direct fuel consumption according to the features of the residential stock (size, age). As far as emissions from ground transport are concerned, the analysis showed that the form of cities and the features of the vehicle stock are key determinants of emissions. High density enables cities to satisfy a relevant quota of passenger demand through non-motorized transport and, thanks to a diffused network, through public transit. On the other hand, the efficiency of the vehicle stock can balance the role of transportation modes. This research phase has given rise to a publication on the “International Journal of Climate Change Strategies and Management”.

The issue of determinants of urban GHG emissions is now being studied by the research team with a quantitative perspective, in collaboration with other IEFE researchers (in particular, Olha Zadorozhna gave support on the quantitative approach). The current research focuses on emissions from ground transport of European cities. Available data at the European level are being used to evaluate a set of variables through a linear regression and to determine their relevance in influencing emissions from urban mobility. The main results of the analysis confirm the relevant and negative correlation of population density with transportation emissions, even when considered jointly with other explanatory variables, as ensued from previous studies published in literature. This research phase is giving rise to a paper, which has been accepted for the ISEE 2012 conference and which will be presented in June 2012.

#### **Life Cycle Assessment (LCA) of Beer Brands Carlsberg, Tuborg, BAP Chiara Originale and BAP BOCK Produced by Carlsberg Italia**

Research Director: Fabio Iraldo

Research Team: Andrea Fontanella

Timing: 2010–2011

Beers produced by Carlsberg Italia are distributed in three different ways: steel kegs, non-returnable glass bottles and D Master kegs. This is a new technology of PET kegs developed by Carlsberg Italia. The project carried out a Life Cycle Assessment (LCA) of the three distribution systems with a special focus on the real environmental benefits of the new technology compared to traditional technologies. On the basis of the project's LCA analysis, together with Carlsberg's aim of communicating the environmental properties of its products, in December 2010 Carlsberg Italia became the first beer producer in the world to obtain an Environmental Product Declaration (EPD®) for the “beer product”, a certified

environmental declaration developed in accordance with the standard ISO 14025 (EPD 264 “Carlsberg and Tuborg beer”).

The EPD obtained in 2010 was pre-certified because of the absence of specific Product Category Rules (PCR) within the EPD system for the beer product. In 2011, the project carried out the development of beer PCR, that went through an open consultation with main Carlsberg stakeholders, and new LCA and EPDs according to the approved PCR. Unlike the previous year, Carlsberg chose not to renew the EPD for Carlsberg and Tuborg beer, but to develop four different EPDs for the four main brands distributed in Italy: Carlsberg, Tuborg, BAP Chiara Originale and BAP Bock.

The activities also included a support to Carlsberg Italia for the communication of the environmental benefits of the new technology within the market launch of the new PET kegs.

### **BRAVE – Better Regulation Aimed at Valorizing EMAS**

Research Director: Michela Melis

Research Team: Michele Barberio, Andrea Fontanella

Timing: 2011–2014

BRAVE is a project funded within the European Commission’s Life+ Programme and aimed at supporting the full integration of EMAS in EU environmental legislation as leverage to facilitate implementation by single organizations (better regulation) and to remove, reduce and simplify the administrative costs and burdens for registered organizations as a way to encourage the adoption and spread of EMAS (regulatory relief). SMEs traditionally find it harder to comply with environmental legislation due to the excessively complicated and time-consuming legislation and requirements. The BRAVE project addresses this problem by recalling the objectives and problems raised by three main European policies and acts:

- Environmental Compliance Assistance Programme, “ECAP”, (COM (2007) 379 final)
- The EU Better Lawmaking and Better Regulation policies
- The aims of the EU Regulation 1221/2009 (EMAS III) related to better regulation and regulatory relief for EMAS registered organizations

In 2011, the BRAVE partners started carrying out the following actions within the project:

1. Analysis of how state of the art and effective regulatory reliefs are supporting EMAS registered organizations at European, national and regional levels
2. Investigation of the available opportunities to include EMAS-incentives in European Directives in force or at a preparatory stage
3. Overview of the existing experiences and their effectiveness dealing with incentives for EMAS registered organizations

### **THINK - Think Tank Advising the European Commission on Mid- and Long-Term Energy Policy - The Impact of Climate and Energy Policies on the Public Budget of EU Member States**

Research Director: Pippo Ranci

Research Team: Maria Grazia Paziienza, Sophia Ruester, Martina Sartori, Marzio Galeotti, Jean-Michel Glachant, Luis Olmos

Foreign Partner: Florence School of Regulation, European University Institute, Florence  
(coordinating institution)  
Project Advisors: Christian von Hirschhausen, Pantelis Capros  
Timing: 2010–2011

In the current context, where public budgets are overstretched due to the economic crisis, there is a pressing need to understand the fiscal implications of climate policies. Policies intended to achieve decarbonization will impact both sides of a country's budget via changes in the tax levels and composition of taxes on the one hand, as well as transfer payments and direct investments on the other. Back-of-the-envelope calculations – comparing net public revenues in 2020 for a Baseline and an Enhanced Policy scenario – show that the additional revenues from carbon pricing and the reduction in revenues from excise taxes on fossil fuels clearly dominate other direct and indirect effects of policies on public budgets such as the additional expenditures dedicated to RD&D targeting low-carbon technologies. The aggregated net budget impact of all direct and indirect effects of new climate policies implemented in the Enhanced Policy Scenario on public budgets in 2020 for the EU-27 as a whole – given our simplifying assumptions – amounts to additional net public revenues of about €12.6bn (0.09% in terms of the EU-27 GDP) under medium-level abatement costs. This makes a non-negligible impact which is nevertheless much lower than the impact on public accounts from changes in main macroeconomic variables over time.

### **RP3/3 – Regulation of Liberalized Markets**

#### **Maintaining Electrical System Reliability to Integrate Large Amounts of Variable Renewable Energy. The Role of Energy Storage**

Research Director: Annalisa D'Orazio  
Timing: 2011–2012

As Italy progresses towards its goal of 30-40% renewable energy sources in the power system, the potential for flexible resources and energy storage takes on great relevance. New solutions and technologies, in fact, help integrate variable renewable resources (such as wind and solar) and maintain a reliable and stable electric grid. In 2011 the Italian Government adopted D.Lgs. 28/2011 and D.Lgs. 93/2011 including, among others, an assessment of the impacts of variable renewable energy on the power system.

The research project aims to analyze additional efforts required by large amounts of renewable energy into existing power systems and assess the potential role of energy storage in mitigating the impact. The anticipated growth in large amounts of renewable sources is challenging policy makers and regulators to look at how the Italian grid will accommodate these resources. A review of the international experience provides perspectives and suggestions to our analysis on various technologies and solutions for managing renewable intermittency. In many countries the variable renewable capacity is more than 30-40% of the electricity generation, so they are useful case studies.

The first phase of the project takes into account the Italian scenarios of increasing levels of variable renewable energy generating resources, assesses the potential grid impacts and proposes technical solutions to mitigate impacts.

The second phase focuses on the analysis of energy storage for the Italian power

system. The study assesses current storage technologies, discusses different policies affecting their deployment in Italy and outlines future energy power system reforms.

### **Costs and Benefits of the Italian Smart Gas Metering Program**

Research Director: Guido Cervigni

Research Team: Matteo Di Castelnuovo and Antonio Sileo

Timing: 2011

IEFE assessed existing policies, at both European and national levels, for the large-scale deployment of smart gas meters in Italy. In particular, IEFE focused on cost-benefit analyses which, as required by the Third Package, have been carried out in several countries so far, including Italy, the UK and France. The authors found substantial differences in both the value and the type of expected benefits, which have been identified in these analyses. IEFE concluded that the “business case” for a large-scale deployment of smart gas meters still appears unclear, especially when it is not done in combination with smart electricity meters. Therefore, it was suggested that a more thorough review of the costs and benefits yielded by smart gas meters should be conducted at both Italian and European levels and that other options (e.g. new regulation), should be investigated prior to committing businesses and consumers to such a massive investment plan. This research has been funded by Federutility, Federestrattiva and Assogas.

### **Economic Regulation of Water Services in Italy**

Research Director: Antonio Massarutto

Research Team: Monica Bonacina (IEFE); Paolo Ermano (Università degli Studi di Udine); Matteo Graffi (Università degli Studi di Udine); Barbara Antonioli (Università della Svizzera Italiana, Lugano)

Timing: 2010–2011

The study aimed to support the ongoing reform of economic regulation of water services in Italy, based on the results of a previous study already published in the IEFE Research Reports. More in detail, the study has provided an economic evaluation of the outcomes of the 1994 reform with a social welfare perspective, adapting a multi-stakeholder approach already developed by Florio (2007). The study has documented the progresses made since the reform, which are significant though still insufficient to reach the target of modernizing the Italian water industry and achieving the demanding targets set by EU directives. Focus has been placed on the analysis of the regulatory weaknesses that have slowed the reforming process and advanced a number of policy recommendations.

Research outputs are partially contained in a research report forthcoming on the IEFE website, and a number of academic papers that have been submitted to major academic journals and are currently under refereeing.

The research was financed by a pool of public (in-house) and partially privatized utilities, in collaboration with the national utility association (Federutility) and also with the support of the Italian National Regulatory Authority for Water Services (CONVIRI). The drafting of the final report is in progress; from the research we expect to obtain papers and articles to be submitted to international journals.

## **Smart Grids: The Regulatory Framework**

Research Director: Clara Poletti

Research Team: Giuseppe Buglione, Antonio Sileo

Timing: 2010–2011

Within the EnergyLab Research Project on Smart Grids, IEFE's role is to analyze the economic and regulatory aspects related both to the deployment of smart distribution grids and the use of these new technologies. To achieve the main benefits it is necessary to adapt market design and regulation to the requirements of new networks and operators. This calls for interventions such as a change in the rules for dispatching and accessing the network or reform of the price-cap mechanism. As an application of these concepts, two Italian pilot projects are considered: the experimentation in the Southern regions and the use of electric vehicles in the cities of Rome and Milan.

## **Investments on Transport Infrastructure of Natural Gas and Electricity**

Research Director: Clara Poletti

Research Team: Guido Cervigni, Anna Cretì, Federico Pontoni, OlhaZadorozhna

Partners: CSIL, Milan; CERRE, Brussels

Timing: 2010–2011

We developed a unified methodological framework to assess costs and benefits of gas and electricity transmission network upgrades.

For the electricity transmission investments, our approach was based on a Security Constrained Optimal Dispatch model. That model allows forecasting of the wholesale market outcome “with and without” the proposed network upgrades and simultaneously assesses most of their effects, including electricity wholesale prices, network losses, ancillary service costs, emissions and system security. Depending on the specific features of the model implemented, some effects may have to be assessed partially off-model. Typically the assessment of the effects of the network upgrades on the generators' market power and on system reliability requires some off-model analysis.

The general framework for a cost-benefit analysis of a gas transmission investment does not conceptually differ from the one discussed for the electricity. In either case the value of a transmission upgrade is the net-surplus of the additional transactions that are made feasible by the upgrade. On that basis we developed a methodology based on identifying the set of additional transactions with the highest net-surplus that can be supported as a result of the gas network upgrade. The methodology addresses the specific economic and institutional features of the gas industry. First, most of the gas consumed in Europe is imported from non-European countries. Therefore, if the SOs and the Regulators act on behalf of the European citizens, the welfare notion relevant for the assessment of the gas transmission upgrades should not include the producers' profits. Second, long-haul transmission infrastructures are usually idiosyncratic to investments in gas production. One would therefore expect merchant investment to feature prominently in that area. The third feature specific to gas relates to the trading arrangements. Finally, forecasting the future transactions of gas in order to assess the market value of gas transmission upgrades may be difficult, given the lack of transparency and the nature of the transactions. For those reasons our proposed methodology for the gas industry seeks to extract the greatest possible deal of information from the market.

Research was sponsored by Elia, the Belgian electricity system operator and Fluxys, the Belgian gas system and transmission operator.

### 3. Thematic Observatories

In addition to conducting research projects, the Center also manages thematic Observatories, open both to members and non-members, which focus on topics and issues of particular policy interest. These Observatories are high-level working platforms, where researchers, firms and institutions meet to discuss and compare different views and methods of analysis.

#### **Observatory on Energy and Environmental Policy (OPEA)**

This Observatory was established in 1995 with the goal of monitoring development in European and Italian energy and environmental policies, in order to assess their implications for the Italian industrial and economic system and promote dialogue between actors in the political, institutional and industrial environments. Companies operating in the electricity and gas industries typically participate in this Observatory. In 2011 the Observatory organized a meeting (on February 17), jointly promoted with the European Commission (Milan Office), on the evolution of the electricity market (“Quale futuro per il mercato elettrico”). The meeting’s opening remarks were given by the European Commissioner Antonio Tajani.

#### **Observatory on Integrated Environmental Management Systems (OSIGA)**

This Observatory, established in 1997, is a qualified venue for discussing and analyzing emerging environmental management issues at the Italian and international levels. It monitors ISO and EMAS environmental registrations and certifications and provides constantly updated information on the development of new environmental policy tools at the Italian and EU levels. Central and local institutions, accreditation and certification bodies, trade and industrial associations, environmentalist and consumer associations, trade unions and industrial and service companies specialized in environmental management participate in the Observatory.

In 2011 the OSIGA meetings addressed the following issues:

- The new standard ISO 26000: 2010 “Guidance on Social Responsibility” (6 June)
- The SISTRI System (Sistema di controllo della tracciabilità dei rifiuti) (11 April)
- The Integrated Management of Occupational Health and Safety Issues: New Issues and Trends (1 March)
- The Effects of the Application of the EU IPPC Directive on Companies’ Management and Competitiveness (1 March)

#### **Observatory on Communication and Environmental Information (CIA)**

This Observatory was established in 2006 as an observatory on environmental information and participation. In its first two biennia (2006-2008, 2008-2010) it monitored Italian and international legislation governing information, participation

and access to environmental law and justice. Its main purposes have been to promote a uniform implementation of the law and define policy guidelines for administrative transparency in the environmental sector.

The Observatory has subsequently widened its scope to environmental communication and information strategies of companies, public administrations and non-profit entities.

The European Commission, public institutions such as the Italian Ministry of the Environment, regions, regional environmental protection agencies, consortia of waste recovery and recycling and professional associations participate in this Observatory. During 2011 the following meetings were held:

- Energy Certification of Buildings: The meaning of labels (conference) (12 December);
- Local Referenda on Environmental Topics (6 July)
- Stakeholder Involvement and Communication Aspects within the Covenant of Mayors Initiative (20 April)
- Environmental Communication in the Beverage Sector: Presentation of two applications of LCA methodology (25 January)

## 4. Other Activities

### **CERRE**

Providing top quality studies, training and dissemination activities, the **Centre on Regulation in Europe (CERRE)** ([www.cerre.eu](http://www.cerre.eu)) was set up in 2010 to promote robust and consistent regulation in Europe's network industries. CERRE's members are regulatory authorities and operators in those industries as well as universities.

The possibility for all consumers and users to have access to quality services at reasonable prices is not yet today the general rule for Europe's network industries. Good regulation is thus necessary to improve both the EU process of liberalization of those industries and, more widely, public governance.

CERRE's threefold objective is: 1) promoting robustness and consistency in regulation processes and systems in Europe; 2) clarifying the respective roles of market operators, governments and regulatory authorities; 3) recommending and disseminating top quality regulation practices. CERRE studies are geared towards the concrete strategic and operational needs of its members.

CERRE's Director General is Bruno Liebhaberg, Professor at the Solvay Brussels School of Economics and Management, Université Libre de Bruxelles. Joint Academic Directors are Martin Cave, Professor at the London School of Economics and Political Science; Jean-Claude Maun, Professor and Dean of the Engineering School (Ecole Polytechnique), Université Libre de Bruxelles; Pierre Larouche, Professor and Co-Director of the Tilburg Law and Economics Centre (TILEC), Tilburg University; Guido Cervigni, IEFE, Università Commerciale Luigi Bocconi.

### **EnergyLab**

**EnergyLab Foundation** ([www.energyfoundation.org](http://www.energyfoundation.org)) was founded in Milan in September 2007 with the goal of creating a network between universities, the business world and regional and local government. The foundation aims to support research, development and innovation and to promote awareness of energy-related matters among the public, government institutions, private bodies and the media. The founding members are the Lombardy Regional Government, the Milan City Council, Università Commerciale L. Bocconi, Università degli Studi di Milano-Bicocca, Università Cattolica del Sacro Cuore, Politecnico di Milano, Università degli Studi di Milano, the AEM Foundation and the Edison Foundation. RSE – Ricerca sul Sistema energetico S.p.A. is a participant institution in the foundation.

IEFE Director **Michele Polo** is a member of the Executive Committee of the EnergyLab Foundation, while IEFE Research Fellow **Marzio Galeotti** is a member of EnergyLab Scientific Committee.

Among other activities, EnergyLab's research is organized around laboratories aimed at facilitating and promoting interaction between experts in universities, industry and government with respect to energy-related issues that are held to be of significant current interest and/or involve a high degree of innovation. In the 2009-2011 three-year period the foundation launched five Research Laboratories on: 1)

Renewable Energy Sources 2) Nuclear Energy 3) Smart Grids 4) Sustainable Mobility 5) Access to Energy. IEFE research projects play an active role in these labs, either as members of each lab's scientific committee or by directly carrying parts of the lab research project.

As in the previous year, in 2011 IEFE has been active in the lab on the production of nuclear energy for civil needs and on smart grids: the evolution in infrastructures and the provision of electricity. Former Director Clara Poletti was involved in this Lab's activities, as well as on those dealing with Smart Grids and Sustainable Mobility. IEFE researchers Edoardo Croci and Antonio Sileo attended meetings and collaborated to the activities of the Lab on sustainable mobility. IEFE researchers Marzio Galeotti, Arturo Lorenzoni, and Niccolò Cusumano were part of the activities of the lab on Renewable Energy Sources. Finally, Marzio Galeotti was also involved in the Lab's activities on access to energy, whose scientific committee is chaired by Pippo Ranci, a member of IEFE's scientific committee. (For more information see, in Italian: <http://www.energylabfoundation.org/attivita/i-laboratori/>.)

### **Policy Notes**

Since 2008 IEFE researchers have been contributing to the Italian debate on relevant issues surrounding energy and environmental policy. These policy notes are often also published in specialized fora, typically websites, magazines or newspapers. Here is the list for 2011.

- 30 December 2011  
Quale energia per il futuro? Scenari a confronto, interview with Stefano Pogutz and Federico Pontoni (La Stampa.it)
- 15 December 2011  
Così l'Europa ha salvato Durban, by Marzio Galeotti and Alessandro Lanza (Lavoce.info)
- 8 November 2011  
Distribuzione gas: siamo arrivati al punto?, by Antonio Sileo (AGI Energia)
- 30 September 2011  
Frequenze TV: Italia fa l'opposto dell'Europa, by Annalisa D'Orazio (Lavoce.info)
- 15 September 2011  
Uscita di sicurezza dal nucleare, by Marzio Galeotti (Lavoce.info)
- 2 September 2011  
Come cambia la geografia del petrolio, by Marzio Galeotti (Lavoce.info)
- 4 August 2011  
Acqua sul dopo-referendum, by Antonio Massarutto (Lavoce.info)
- 28 June 2011  
Quando a Milano c'erano i furbetti della monnezza, by Antonio Massarutto (Lavoce.info)
- 17 June 2011  
Parola d'ordine: Programmare, by Marzio Galeotti (Lavoce.info)
- 10 June 2011  
A Milano si vota sull'ambiente, by Marzio Galeotti (Lavoce.info)
- 7 June 2011  
Uscire dall'atomo, come la Germania, by Marzio Galeotti (Lavoce.info)
- 7 June 2011  
Al nucleare manca il consenso, by Ludovico Ferraguto and Antonio Sileo (Lavoce.info)

- 24 May 2011  
L'ecopass elettorale, by Marzio Galeotti (Lavoce.info)
- 20 May 2011  
Sviluppo verde? L'Italia non ci crede, by Marzio Galeotti (Lavoce.info)
- 17 May 2011  
Referendum sull'acqua: le domande giuste, by Andrea Boitani and Antonio Massarutto (Lavoce.info)
- 13 April 2011  
L'efficienza energetica: Cenerentola o Principessa, by Clara Poletti (GME Newsletter)
- 1 April 2011  
Rinnovabili senza sussidi ad ogni costo, by Annalisa D'Orazio (Lavoce.info)
- 29 March 2011  
Che ci azzecca la benzina con la cultura?, by Marzio Galeotti (Lavoce.info)
- 22 March 2011  
Quello strano dibattito intorno all'atomo, by Marzio Galeotti (Lavoce.info)
- 11 March 2011  
Energie rinnovabili abbandonate all'incertezza, by Annalisa D'Orazio (Lavoce.info)
- 8 March 2011  
Libia-Italia. La vita dopo Greenstream, by Antonio Sileo (AGI Energia)
- 8 March 2011  
Energia: lo sguardo lungo dell'Europa, by Marzio Galeotti (Lavoce.info)
- 25 February 2011  
Ritorno al nucleare e Corte costituzionale. Atto secondo, by Antonio Di Martino and Antonio Sileo (nelMerito.com)
- 25 February 2011  
Gas e petrolio della Libia mettono in ginocchio l'Italia?, by Federico Pontoni (ilsussidiario.net)
- 22 February 2011  
La Libia e noi, by Marzio Galeotti (Lavoce.info)
- 9 February 2011  
I mercati elettrici in Europa, interview with Clara Poletti (AGI Energia)
- 8 February 2011  
Quell'energia che arriva dal mondo arabo in subbuglio, by Marzio Galeotti (Lavoce.info)
- 31 January 2011  
Elettricità, un mercato che cambia, interview with Clara Poletti (Staffetta Quotidiana)
- 27 January 2011  
Guerre sante contro nemici sbagliati, by Antonio Massarutto (Lavoce.info)
- 25 January 2011  
Alla canna del gas, by Alessandro Fiorini, Gionata Picchio and Antonio Sileo (Lavoce.info)
- 15 January 2011  
Mercato elettrico Italia secondo Poletti, interview with Clara Poletti (Quotidiano Energia)
- 11 January 2011  
Nucleare: lo stato dell'arte in Italia, by Antonio Sileo (AGI Energia)
- 3 January 2011  
Una nuova era per l'automobile, by Antonio Sileo (Greenews.info)

## 5. Working Paper Series

IEFE Working Paper n. 41

### **Environmental Strategies by the Banking Sector: Case Studies in the Italian Context by Fabio Iraldo, Michela Melis and Alessia Sabbatino**

Up to today, research and studies have been focused, from time to time, on the different financial tools through which a bank may affect the environment, with the aim of understanding the drivers and barriers that can influence their adoption and successful implementation.

The paper aims at providing a more in-depth analysis of the ways in which a bank sets up and implements these different available tools, when it comes to deciding the strategies and objectives for the business channels on which it focuses. By means of a case-study methodological approach, the experiences of three Italian banks are analyzed, with the ultimate goal of identifying a clear-cut framework of conditions that have to be ensured in order to guarantee the effectiveness of banks' environmental strategies.

Findings provide evidence that, in order to be effective, these strategies should rely on well-designed specific tools, that are able to guarantee the right balance between: i) the positive impact on the environment, ii) the attractiveness for the clients and iii) the financial and competitive feasibility for the bank.

IEFE Working Paper n. 42

### **A Note on Asymmetries in Heating Degree Days and Natural Gas Consumption Dependence Structure. An Archimedean Copula Framework on the Italian System by Alessandro Fiorini and Antonio Sileo**

An important tool in order to carry out research for modeling and managing energy demand and supply is explaining variables with measures reflecting weather variations. For example, handlings with heating degree days represent an easy way to account for almost 100% of natural gas consumption variations. Setting up a linear model is a standard way to proceed but when the data under examination is other than linearly associated, which is to say jointly Normal distributed, correlation is no longer a measure of dependence and interpreting it as such is both theoretically and practically erroneous. In this context, statistical theory proposes a powerful tool, named a copula function, to model flexible multivariate distributions in order to describe alternative dependence structures with respect to standard ones. The aim of the paper is to check whether heating degree days are a consistent linear predictor for natural gas consumptions. In this context, a case study is developed on a monthly average of heating degree days and monthly (residential and total) natural gas consumption volumes. Estimation results on alternative Archimedean copulas confirm that there is not sufficient evidence supporting a symmetric association with

respect to the range of value variables can jointly assume. The statistical model to be used in this type of analysis should be robust against deviation from joint Normality and nesting linearity as a special case.

IEFE Working Paper n. 43

**Technological Change and the EU ETS: The Case of Ireland**  
**by Barry Anderson, Frank Convery and Corrado Di Maria**

The rate of greenhouse gas reducing technological change and occurrence of environmentally friendly innovation are integral in reducing emissions levels. The European Union commenced the pilot phase of the European Union Emissions Trading System (EU ETS) in 2005 with the intent of enhancing the adoption of existing low-carbon technologies and the development of new technologies by putting a price on CO<sub>2</sub> emissions. We survey Irish EU ETS firms to study the occurrence of CO<sub>2</sub> emissions friendly technological change during the pilot phase (2005-2007) as well as the reasons firms did or did not alter their technology portfolios in response to the price on emissions. Despite declining emissions prices and policy related uncertainty, 48% of responding Irish firms employed new machinery or equipment, 74% made process or behavioral changes, and 41% switched fuels to some degree that contributed to emissions reductions during the pilot phase. The effect of rising energy prices on these emissions and energy saving actions should not be overlooked. In general, we find that the EU ETS was effective in stimulating moderate technological change and also raising awareness about emissions reduction possibilities.

IEFE Working Paper n. 44

**The Demographic Transition and the Ecological Transition: Enriching the Environmental Kuznets Curve Hypothesis**  
**by Marzio Galeotti, Alessandro Lanza and Maria Carla Ludovica Piccoli**

The impact of population growth on the environment is an issue that is highly debated yet comparatively under-researched empirically. This is true despite a vast number of published articles on the link between population and environmental changes speculating on the sign of the environment population elasticity. Although the issue can ultimately only be settled at the empirical level, the above contributions have been largely speculative. It was only in the mid-1990s that population was accounted for in the empirical work on the relationship between environmental quality/degradation and income within the framework of the Environmental Kuznets Curve (EKC) hypothesis. While empirical EKC investigations have provided a useful contribution to the issue, a further important step can be made. Population in the EKC hypothesis is not treated like income but it serves, so to speak, just as a normalizing variable. As it turns out, however, we can also formulate a hypothetical behavior of population's evolution over time vis-à-vis income, that can be accommodated within an EKC framework. This is the Demographic Transition. With the exception of Baldwin (1995), none of the studies mentioned so far have investigated the nexus between pollution, environmental degradation, and income within the conceptual framework of the two transitions: demographic and ecological transitions. The present paper represents the first econometric analysis of Demographic and Ecological Transitions. We incorporate the former into the EKC framework, thus obtaining an enriched EKC hypothesis. Very long time series for 17 OECD countries in the case of CO<sub>2</sub> emissions support our empirical approach.

IEFE Working Paper n. 45

### **Economic Impacts of Climate Change in Italy and the Mediterranean: Updating the Evidence**

**by Marzio Galeotti and Roberto Roson**

This study presents new estimates of economic impacts of climate change for Italy and other countries, obtained with a full-fledged Integrated Assessment Model (ENVISAGE), developed at the World Bank. This model is qualitatively superior to other models used in the past for the same purpose. It was discovered that climate change is expected to reduce the Italian GDP in 2050, with respect to a reference baseline, by -0.31%. This figure is about two times higher than previous estimates. Declining tourism demand is the main driver of negative effects on GDP, as Italy would become less attractive as a tourist destination. By the end of the century, however, Italy would also experience severe losses in agricultural production, due to increased temperature and reduced water availability. Even if Italy is notably affected by climate change, in the absence of any mitigation or adaptation effort, other countries in the Mediterranean will experience larger economic impacts. This is the case of Spain and the Middle East and North Africa.

IEFE Working Paper n. 46

### **Changing the Regulation for Regulating the Change. Innovation-Driven Regulatory Developments in Italy: Smart Grids, Smart Metering and e-Mobility**

**by Luca Lo Schiavo, Maurizio Delfanti, Elena Fumagalli and Valeria Olivieri**

Smart grids, smart meters and electromobility are creating new challenges not only in terms of technological innovation but also in terms of economic and technical regulation. This paper focuses on the technical regulation of electric systems and takes Italy as a case study to analyze how energy regulation can change to embrace and stimulate innovation in power systems and electricity markets. The paper details the regulator's commitment to providing the right economic incentives for distribution network operators to invest in demonstration projects for smart grids. Significant steps forward have also been made to ensure an efficient development of Electrical Vehicle recharging infrastructures. The main findings are:

- Key indicators are necessary to cope with RES integration: this paper presents two of them (Reverse Power-Flow Time, RPT, and Psmart) that can be used elsewhere
- In an initial phase, regulators can get valuable information from demonstration projects, that are an intermediate step between laboratory tests (and prototypes) and full deployment of innovative solutions
- Moving to output-based regulation is the efficient choice for full deployment of innovative solutions
- Integration of the various forms of innovation (smart grids, smart metering, electromobility and storage) is probably the hardest challenge for regulators in the near future

IEFE Working Paper n. 47

### **Debiasing Through Auction? Inertia in the Liberalization of Retail Markets**

**by Paolo Bertoletti and Clara Poletti**

We analyze a market in the process of liberalization. Consumers are biased in favor of the incumbent firm and we assume that they can discover the true value of new

suppliers only by switching. In an infinitely-repeated game setting with Bertrand competition, we first show that efficient entry might not take place. We then evaluate the effect of organizing a public auction for assigning consumers to a default supplier and show that such a mechanism (which respects the freedom of choice by consumers) would support entry efficiency. However, auctioning might also increase inefficient, although temporary, entry.

IEFE Working Paper n. 48

**How Much Do the Neighbors Pay? Economic Costs of International Gas Disputes  
by Olha Zadorozhna**

The paper analyzes financial performance of European companies during Ukrainian-Russian gas disputes in January 2006 and 2009. Investors' reactions to the gas disputes is estimated for companies listed on the European stock exchanges and for which natural gas is the main factor of production. Economic costs of the gas cut-offs are estimated using event study methodology. It was found that the most severe decline in value due to the gas disputes was for companies located in the CEE states that are heavily dependent on Russian gas supply. The paper also contributes to the literature on the bargaining power of states, providing an empirical investigation of how much costs are borne by a party with less bargaining power in the dispute.

The complete list of IEFE working papers can be found and downloaded from the IEFE website.

## 6. Research Report 2011

### **Costi e benefici dell'introduzione di un sistema di "smart metering" nel settore italiano del gas**

IEFE Research Report n. 8 – September

by Guido Cervigni, Matteo Di Castelnuovo, Clara Poletti and Antonio Sileo

Available on the IEFE website.

## 7. Articles and Books

- Anderson B., Di Maria C. (2011), “Abatement and Allocation in the Pilot Phase of the EU ETS”, *Environmental and Resource Economics*, 48, 2011, 83-103
- Creti A. (2011), Book review “Electric Choices: Deregulation and the Future of Electric Power”, in N. Kleit (ed), *Economica*, vol. 308, 394-395
- Croci E., Melandri S. and Molteni T. (2011), “Determinants of Cities’ GHG Emissions: A Comparison of Seven Global Cities”, *International Journal of Climate Change Strategies and Management*, 3, 275-301
- Croci E., Melandri S. and Molteni T. (2011), “Comparing Mitigation Policies in Five Large Cities: London, New York City, Milan, Mexico City and Bangkok”, in D. Hornweeg et al. (eds.), *Cities and Climate Change. Responding to an urgent agenda*, World Bank, Washington D.C.
- Kallis G., Ludwig R., Roson R. and Zografos C. (2011), “Towards an Inter-Disciplinary Research Agenda on Climate Change, Water and Security in Southern Europe and Neighboring Countries”, *Environmental Science and Policy*, vol. 14(7), 794-803
- Immordino G., Pagano M. and Polo M. (2011), “Incentives to Innovate and Social Harm: Laissez-Faire, Authorization or Penalties?”, *Journal of Public Economics*, 95, 864-76.
- Iraldo F., Testa F., Melis M. and Frey M. (2011), “A Literature Review on the Links Between Environmental Regulation and Competitiveness”, *Environmental Policy and Governance*, 21, 210-222
- Iraldo F., Battaglia M. (2011), “Spatial Effects of Labour Policies Promoted in Italy from 1996 to 2006: An Analysis in the EU Context”, *European Planning Studies*, vol.19(2), 311-330
- Iraldo F., Daddi T., Testa F. (2011), “Evaluating Indirect Environmental Aspects”, *Environmental Quality Management*, vol. 21, issue 1, 53-70
- Iraldo F., Testa F., Frey M. (2011), “The Effect of Environmental Regulation on Firms’ Competitive Performance: The Case of the Building & Construction Sector in Some EU Regions”, *Journal of Environmental Management*, 92, 2136-2144
- Iraldo F., Battaglia M., Testa F. and Daddi T. (2011), “Can ISO:14063 be a Tool to Plan the Environmental Communication Strategy of a Territorial Area?”, *Local Environment*, vol. 16(4), 339-355
- Iraldo F., Frey M., Testa F. and Tessitore S. (2011), “La pubblicità ambientale quale strumento di comunicazione per l’eco-consumatore”, *Finanza, Marketing e Produzione*, vol.1, 34-61
- Iraldo F., Daddi T., Frey M. and Bouchra N. (2011), “The Implementation of an Environmental Management System in a Nord-African Local Public Administration”, *Journal of Environmental Planning And Management*, vol. 54(6), 813-832

- Iraldo F., Frey M., Rizzi F. (2011), “Towards an Integrated Design of Voluntary Approaches and Standardization Processes: An Analysis of Issues and Trends in the Italian Regulation on Ground Coupled Heat Pumps”, *Energy Conversion and Management Journal*, 52, 3120-3131
- Iraldo F., Daddi T., Frey M. and Magistrelli M. (2011), “Do Environmental Management Systems Improve Environmental Performance? Empirical Evidence from Italian Companies”, *Environment, Development and Sustainability*, vol. 13(5), 845-862
- Lorenzoni A. (2011), “Le fonti rinnovabili creano o distruggono lavoro in Italia?”, Convegno Annuale della Rivista Economia e Politica industriale/Journal of Industrial and Business Economics, 20-21 June
- Lorenzoni A. (2011), “La sostenibilità come indirizzo agli investimenti nel settore dell’energia”, *L’Industria*, 2, 213-222
- Lorenzoni A. (2011), “Perché ha senso un’industria che punti sul settore”, *Focus Rinnovabili, Il Giornale dell’Ingegnere*, 8
- Lorenzoni A. (2011), “Le prospettive per le fonti rinnovabili: come cambia rapidamente lo scenario!”, *Alfabeta*
- Massarutto A., de Carli A. and Graffi M. (2011), “Material and Energy Recovery in Integrated Waste Management Systems: Economic Analysis”, *Waste Management*, 31, 2102–2111, (DOI:10.1016/j.wasman.2011.05.017)
- Roson R., Sartori M. (2011), “Cambiamento Climatico e Scarsità Idrica nel Mediterraneo: una Analisi del Commercio Virtuale di Acqua” (Climate Change and Water Scarcity in the Mediterranean: An Analysis of Virtual Water Trade), *QA – Rivista dell’Associazione Rossi-Doria*, vol.22(3), 57-74
- Verdolini E., Galeotti M. (2011), “At Home and Abroad: An Empirical Analysis of Innovation and Diffusion in Energy Technologies”, *Journal of Environmental Economics and Management*, vol. 61(2), 119-134

## 8. Seminars and Conferences

IEFE has organized numerous seminars and conferences, listed below. Programs and presentations can be downloaded from the IEFE website ([www.iefef.unibocconi.it](http://www.iefef.unibocconi.it))

15 December 2011

FEEM-IEFE Joint Seminar **“Endogenous Market Power in an Emissions Trading Scheme”** by Corina Haita (CEU-Central European University and ELTE-Eotvos Lorand Tudomány Egyetem, Budapest University)

12 December 2011

Conference on **“La certificazione energetica degli edifici. Il significato dei marchi”** organized by IEFE in collaboration with Commissione Europea Rappresentanza a Milano

2 December 2011

Conference on **“Il programma italiano di smart gas metering”**

29 November 2011

Conference on **“Energia e sviluppo sostenibile: politiche pubbliche e strategie d’impresa. Una visione incrociata Francia-Italia”** organized by IEFE in collaboration with Ambassade de France en Italie

28 November 2011

Conference on **“La regolazione degli investimenti nelle reti di distribuzione di energia elettrica”**

17 November 2011

FEEM-IEFE Joint Seminar **“The EU ETS: Dead End or Path to the Future?”** by Denny Ellerman (Massachusetts Institute of Technology)

4 November 2011

IEFE Seminar **“Debiasing Through Auction? Inertia in the Liberalization of Retail Markets”** by Paolo Bertolotti (Università di Pavia)

20 October 2011

FEEM-IEFE Joint Seminar **“Climate Change Impacts in the Mediterranean: The Economic Assessment of the CIRCE Project”** by Francesco Bosello (Università di Milano and FEEM)

7 October 2011

International Conference **“The Development of Renewable Energy Joint Projects with Third Countries”** organized as part of the RE-Shaping Project, with the support of Intelligent Energy Europe

27 September 2011

Conference on **“Le prospettive per la green economy nella crisi economica”** organized by IEFE in collaboration with Fondazione per lo Sviluppo Sostenibile

22 September 2011

FEEM-IEFE Joint Seminar **“Optimal Spatial Pricing and its Impact on Renewable Generation in Great Britain”** by Matteo Di Castelnuovo (IEFE)

7 July 2011

FEEM-IEFE Joint Seminar **“Carbon Capture & Storage (CCS): Technology Issues and Worldwide Projects”** by Mario Marchionna (ENI)

27 June 2011

Conference on **“Rinnovabili termiche ed efficienza energetica. Politica e mercato”** organized by IEFE in collaboration with REF Ricerche per l'economia e la finanza.

24 June 2011

IEFE Seminar on **“Understanding Innovation in Carbon Capture and Storage: Lessons from Patents”** by Barry Anderson (IEFE)

9 June 2011

FEEM-IEFE Joint Seminar **“Analisi di scenario a supporto delle policy in campo energetico: l'esperienza dell'Ufficio Studi dell'ENEA”** by Carlo Manna (ENEA)

30 May 2011

Department of Management and Technology-IEFE Joint Seminar **“Institutional Logics and Regional Cluster Emergence: Evidence from the Wind and Solar Energy Industries”** by Michael Russo (University of Oregon)

12 May 2011

FEEM-IEFE Joint Seminar **“Does Cleanup of Hazardous Waste Sites Raise Housing Values? Evidence of Localized Effects from Restricted Access Census Block Data”** by Shanti Gamper-Rabindran (University of Pittsburgh)

5 May 2011

Conference on **“L'energia nucleare: riflessioni dopo l'incidente di Fukushima”** co-organized with CERTeT Bocconi

29 April 2011

IEFE Seminar **“Biomasse legnose a fini energetici: lo 'sleeping giant' delle rinnovabili?”** by Davide Pettenella (Università di Padova)

15 April 2011

Conference on **“General Equilibrium Modeling of Climate and Energy Impacts and Policies: Recent Developments”**

14 April 2011

FEEM-IEFE Joint Seminar “**Reconciling Climate Policy and Energy Security: Results and Recommendations from the SECURE Project**” by Andrea Bigano and Manfred Hafner (FEEM)

24 March 2011

FEEM-IEFE Joint Seminar “**The Regulation of Interdependent Markets**” by Carlo Scarpa (Università di Brescia)

11 March 2011

IEFE Seminar “**Organizational Ecosystem Embeddedness and its Implications for Sustainable Fit Strategies**” by Stefano Pogutz (Università Bocconi)

4 March 2011

IEFE Seminar “**La riforma del bilanciamento gas**” by Federico Boschi and Massimo Ricci (AEEG)

24 February 2011

FEEM-IEFE Joint Seminar “**Efficient Mechanisms for Access to Storage with Imperfect Competition in Gas Markets**” by Alberto Cavaliere (Università di Pavia)

11 February 2011

IEFE Seminar “**Environmental Performances and Innovation Spillovers. Empirical Evidence from the Regional Italian NAMEA**” by Massimo Mazzanti (Università di Ferrara and CERIS-CNR)

4 February 2011

IEFE Seminar “**Meccanismo aste al ribasso nella promozione RES. Esperienze internazionali e suggerimenti per l’Italia**” by Annalisa D’Orazio (Sorgenia and IEFE)

20 January 2011

FEEM-IEFE Joint Seminar “**The Policy Path to Law-Carbon Society**” by Frédéric Gherzi (CIRED-CNRS and FEEM)

## 9. Structure\*

Working at IEFE are tenured professors and researchers from Università Bocconi and other universities, along with research fellows with contracts or grants connected to the Center itself, as well as expert consultants in specific areas. The Center is managed by the President, the Steering Committee, the Scientific Committee and the Members' Committee.

**President:** Alberto Meomartini, Chairman of Assolombarda and of Saipem

**Honorary President:** Renzo Capra

**Director:** Michele Polo

**Research Fellows:** Barry Anderson, Michele Barberio, Monica Bonacina, Enrico Botta, Angelo M. Cardani, Guido Cervigni, Anna Cretì, Edoardo Croci, Niccolò Cusumano, Alessandro de Carli, Annalisa D'Orazio, Andrea Fontanella, Marco Frey, Marzio Galeotti, Fabio Iraldo, Arturo Lorenzoni, Antonio Massarutto, Sabrina Melandri, Michela Melis, Caterina Miriello, Tania Molteni, Augusto Ninni, Federico Pontoni, Roberto Roson, Martina Sartori, Antonio Sileo

**Secretarial Office:** Lia Bertoglio

**Administrative Office:** Dora Milanesi

\* As of December 2011

## 10. Steering Committee\*

Miguel Antónanzas, E.ON Italia, Chairman of the Board of Management  
Roberto Bazzano, Federutility, President  
Paolo Colombo, Enel, Chairman  
Giancarlo Cremonesi, Acea, Chairman  
Bruno D'Onghia, EdF- Representative Office in Italy, Director  
Pasquale De Vita, Unione Petrolifera, Chairman  
Edoardo Garrone, Erg, Chairman  
Bruno Lescoeur, Edison and Edipower, CEO  
Gian Marco Moratti, Saras, Chairman  
Luigi Roth, Terna, Chairman  
Paolo Scaroni, Eni, CEO  
Tomaso Tommasi di Vignano, Hera, Chairman  
Giuliano Zuccoli, A2A, President of the Management Committee and Assoelettrica,  
Chairman\*\*

### **De Jure Members**

Alberto Meomartini, IEFÉ President  
Bruno Pavesi, Chief Executive Università Bocconi, or his delegate  
Michele Polo, IEFÉ Director  
Guido Tabellini, Rector Università Bocconi, or his delegate

\* As of December 2011

\*\* To be replaced during the next meeting of IEFÉ associates.

## 11. Scientific Committee

**President:** David Newbery, University of Cambridge (UK)

### **Members**

Frank Convery, University College Dublin (IRL)

Claude Crampes, École d'Économie de Toulouse (F)

Thomas C. Heller, Stanford University, (USA)

François Lévêque, École des Mines, Paris (F)

Ignacio Pérez-Arriaga, Comillas University, Madrid (E)

Michele Polo, IEFÉ Director (de jure)

Pippo Ranci, Università Cattolica del Sacro Cuore di Milano (I)

Carlo Scarpa, Università di Brescia (I)

Jonathan Stern, Oxford Institute for Energy Studies (UK)

Nils-Henrik von der Fehr, University of Oslo (N)

Catherine Waddams, University of East Anglia (UK)

## 12. Associated Companies and Organizations

1. **ABB:** Alessandro Clerici, Senior Advisor to the President
2. **ACEA:** Adolfo Spaziani, Studies and Research Director; Paolo Carta, Regulatory Affairs Market and Corporate Studies
3. **A2A:** Patrizia Savi, Planning, Finance and Control Director
4. **ANIGAS:** Luciano Buscaglione, Managing Director; Bruno Tani, Chairman
5. **ANSALDO ENERGIA:** Giuseppe Zampini, CEO
6. **ASSOELETTRICA:** Stefano Pupolin, Managing Director; Antonio Livrieri, Technical Director
7. **ASSOGAS:** Sergio Sala, Managing Director
8. **CVA TRADING:** Paolo Giachino CEO; Danilo Angrilli, Environment Market Manager
9. **EdF- Representative Office in Italy:** Bruno D’Onghia, Director
10. **EDIPOWER:** Alberto Mariotti, Energy Management Director
11. **EDISON:** Bruno Lescoeur, CEO
12. **ENEA:** Giovanni Lelli, Commissioner
13. **ENEL:** Simone Mori, Regulatory and Environmental Director
14. **ENI:** Paolo Scaroni, CEO
15. **ENI – DIV.NE GAS & POWER:** Domenico Dispenza, Managing Director
16. **E.ON Italia:** Miguel Antónanzas, Chairman
17. **ERG:** Lucia Bormida, Authorities and Government Relations Manager
18. **FEDERUTILITY:** Roberto Bazzano, Chairman; Adolfo Spaziani, Managing Director
19. **FOSTER WHEELER ITALIANA:** Rosa Maria Domenichini, Director of Power Division; Andrea Fava, Director of Environmental Division
20. **GME – GESTORE MERCATO ELETTRICO:** Massimo Guarini, CEO; Alessandro Talarico, Institutional Relations & Communication Director
21. **GSE – GESTORE DEI SERVIZI ELETTRICI:** Gerardo Montanino, Director of Operations; Costantino Lato, Engineering Unit Manager
22. **HERA:** Tomaso Tommasi di Vignano, Chairman; Giovanni Taglialatela, Regulatory Affairs Manager
23. **IREN ENERGIA:** Roberto Garbati, CEO
24. **REPOWER ITALIA:** Fabio Bocchiola, Chairman
25. **SAIPEM:** Alberto Meomartini, Chairman
26. **SARAS:** Dario Scaffardi, Managing Director; Giuseppe Citterio, Margin Management
27. **SOGIN:** Fabio Chiaravalli, Environmental Area Manager
28. **TERNA:** Luigi Roth, Chairman; Luigi de Francisci, Regulatory Affairs Director
29. **UNICREDIT:** Giorgio Capurri, Corporate Sustainability - Group Identity and Communications Area
30. **UNIONE PETROLIFERA:** Pasquale De Vita, Chairman

