CHAIRE EUROPEAN ELECTRICITY MARKETS
Fondation Paris-Dauphine

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Research chair supported by

Rte EDF EPEXSPOT EUROPEAN POWER EXCHANGE UFE Union Française de l'Électricité

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Foreword by Jan Horst Keppler, Scientific Director of the CEEM
2014 – An electrifying and active year

Among commentators on the electricity sector it has become a truism to refer to another " electric year " in an industry under tension. However, despite the repetition, these descriptions remain entirely appropriate. 2014 was another year marked by numerous challenges and uncertainties in European electricity markets. Let us examine three representative points from the closing months of this year:

- At the end of September 2014, the nine transmission systems operators of the Central Western European (CWE) zone decided to postpone the introduction of flow-based market coupling upon the request of Elia, a Belgian operator, which cited a forecast of "exceptional stress" on its network for the winter of 2014/2015.

- On 30 November 2014, after an asset depreciation of € 4.5 billion, the German electric utility E.ON announced the separation of its renewables, transmission systems, and energy services from its conventional production and trading activities.

- In December 2014, EDF postponed its decision to invest in two new nuclear reactors at Hinkley Point (UK) until March 2015, despite having the approval of the European Commission for its contract-for-difference with the British government.

Two conclusions can be drawn from these events. First, stakeholders are behaving more cautiously. Second, it highlights the divergent fates of new industries that are guaranteed funding and conventional industries which must derive income from deregulated markets: the case of E.ON is a case in point.

Events turned out quite differently from what they were meant to be. In 2012, Commissioner of Energy Günther Oettinger solemnly announced the completion of the unified electricity market as the centerpiece of European energy policy by 2014. Yet 2014 has come and gone and hardly anyone mentions that objective anymore. This is less the result of the administrative and legal wrangling over achieving the "target model" through a body of harmonized network codes than it is the result of an electricity market that is no longer able to assume its central function of ensuring the long-term equilibrium between supply and demand. While the European day-ahead and short-term markets continue to organize dispatch in a satisfactory manner, few believe that the forward market alone can attract the investment necessary to assure the high security of supply that European customers have become accustomed to. The market is facing several challenges: the emergence of subsidized intermittent renewables, falling prices, the early retirement of gas power stations, and the general stagnation of investment (with the exception of specific niches, such as demand management).

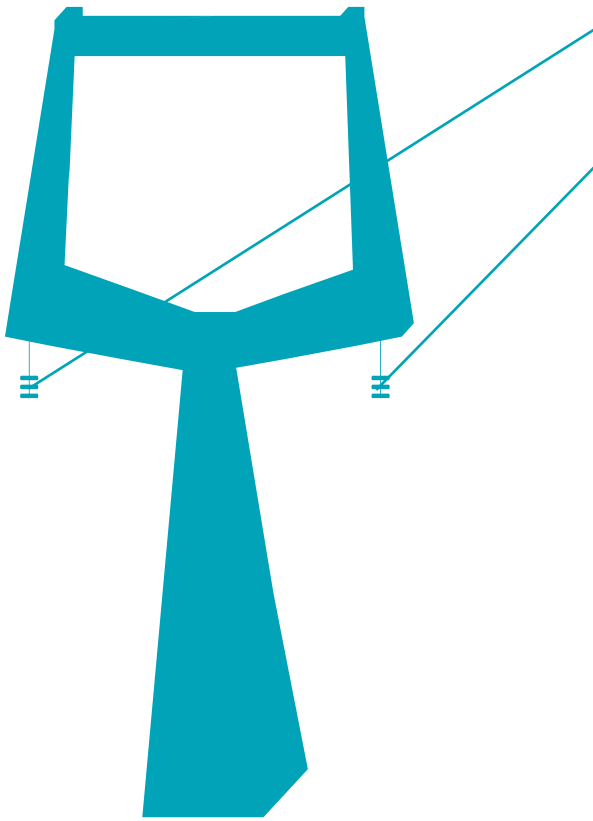
While these challenges are widely recognized, no short-term solutions are forthcoming. The indecision of major stakeholders is palpable. If the most innovative solution is to put the assets ensuring the bulk of the supply-demand balance into an electrical "bad bank", then the message is clear: the European electricity market has lost its compass.

For the Chaire European Electricity Markets (CEEM), operating in an industry which is seeking a new equilibrium configuration is as much an opportunity as it is a challenge. Motivated by the support of its partners and a strong social and academic demand for research and debate in the electricity industry, the CEEM has worked on all major issues of the sector: pricing, capacity, demand, interconnections, smart grids, investments, and renewables.

In 2014 the CEEM has organized 7 major workshops and conferences, 5 internal research seminars, and participated in 9 energy economy research seminars hosted by Paris-Sciences-Lettres (PSL). We are particularly proud of our seven new Working Papers, all of which are accessible on our website (http://www.ceem-dauphine.org/working/fr), some of which have been submitted to peer-reviewed journals. In conjunction with the research of its doctoral students, this scientific output is the essence of the CEEM.

These achievements make for a satisfactory year 2014. However, we have established a new horizon for 2015. The CEEM wants to advance from the analysis of current state of electricity markets to the development of new proposals to improve its functioning. We intend to increase research into new market structures and incentives to promote a more sustainable economic equilibrium, with more transparency and less uncertainty for producers and consumers. We have already begun organizing a major conference on a "Target Model 2.0" for the electricity sector in early July 2015. It is a safe bet to say that also the coming year will be electric. At the CEEM, we will do our best to put this energy to good use.

Jan Horst Keppler
CEEM Scientific Director



PART 1

PRESENTATION OF THE CHAIRE EUROPEAN ELECTRICITY MARKETS

The Chaire European Electricity Markets (CEEM) is part of an ecosystem of institutions at the Université Paris-Dauphine working on energy matters. It includes the Centre for Geopolitics of Energy and Raw Materials (LEDa-CGEMP), the Master programme in Energy, Finance, and Carbon (EFC), as well as the Chairs of Economics of Climate & Finance and Sustainable Development at the Université Paris-Dauphine. In this context, the CEEM pursues three objectives: (1) Conducting an ambitious academic research programme, (2) Providing a discussion forum for academic and industrial experts, and stakeholders, (3) Contributing to the training of future management of companies in the electricity sector.

The CEEM is the result of a partnership between the Université Paris-Dauphine, the Paris-Dauphine Foundation, and the four founding partners: Réseau de Transport d'Electricité (RTE), Électricité de France (EDF), EPEX SPOT, and the Union Française d'Électricité (UFE).

CEEM Researchers

The team of researchers of the CEEM includes:

- Marie Bessec, Researcher
- Régis Bourbonnais, Researcher
- Mauricio Cepeda, Researcher
- Anna Creti, CEEM Research Axis 1 Director
- Michel Cruciani, Researcher
- Guillaume Dezobry, Researcher
- Dominique Finon, CEEM Research Axis 2 Director
- Patricia Van Horn Florin, Researcher
- Julien Fouquau, Researcher
- Patrice Geoffron, CEEM Research Axis 3 Director
- Stéphane Goutte, Researcher
- Morwenna Guichoux, Doctoral student
- Jan Horst Keppler, CEEM Scientific Director
- Yannick Le Pen, Researcher
- Yuanjing Li, Doctoral student
- Marie Petitet, Doctoral student
- Thao Pham, Doctoral student
- Sébastien Phan, Researcher
- Fabien Roques, Researcher
- María-Eugenia Sanin, Researcher
- Antoine Verrier, Doctoral student
- Manuel Villavicencio, Doctoral student
- Julie Hyun Jin YU, Doctoral student

The Team of the CEEM

Jan Horst Keppler, CEEM Scientific Director and professor of Economics at the Université Paris-Dauphine, is responsible for the general organization of the Chaire and its research activities.

Fatoumata Diallo, CEEM Coordinator

Anna Creti, professor of Economics at the Université Paris-Dauphine, leads Research Axis 1 (European electricity market pricing under market quotas) since October 2013.

Dominique Finon, CEEM Scientific Advisor, leads Research Axis 2 (Organization, structural changes, and regulation of European electricity markets).

Patrice Geoffron, professor of Economics at the Université Paris-Dauphine, leads Research Axis 3 (Transport, distribution, and demand).

PART 2

GOVERNANCE OF THE CEEM

I. Steering Committee

The CEEM is governed by a Steering Committee established by the Charter which binds the Université Paris-Dauphine and the Paris-Dauphine Partnership Foundation to the four founding partners of the CEEM. This Committee defines the program of activities of the Chaire which includes the areas of research, teaching and development, and annual budget review. The members of the Steering Committee are:

- Jan Horst Keppler, CEEM Scientific Director and President of the Steering Committee
- Pierre Bornard, Senior Executive Vice-President, Vice-Chairman of the Management Board of RTE
- Thomas Veyrenc, Markets Department Director, RTE
- Jean-Paul Bouttes, Senior Vice-President, Strategy and Prospects Group, EDF
- Marc Bussieras, Head of Economy, Corporate Strategy and Prospective, EDF
- Jean-François Conil-Lacoste, Chairman of the Management Board, EPEX SPOT
- Jean-François Raux, Advisor to the President and Board Member, UFE
- Patrice Geoffron, Research Professor at the Université Paris-Dauphine
- Aline Desalinelles, Director of the Paris-Dauphine Partnership Foundation
- Jean-Arnold Vinois (non-voting member), Honorary Director of the European Commission and Special Advisor to the Commissioner Oettinger
- Alfred Voss (non-voting member), CEEM Scientific Council President, Institute for Energy Economics at the University of Stuttgart
- Dominique Finon (Observer), CEEM Scientific Advisor

Steering Committee Meeting of 24 March 2014, from 15:00 to 17:00, at the Université Paris-Dauphine (Space One)

Participants :
Jan Horst Keppler, CEEM Scientific Director and President of the Steering Committee
Thomas Veyrenc, Market Department Director, RTE
Silvano Domergue, Director of the Center for Market Models and Economic Studies, RTE
Jonas Tornquist, Head of Economics and Regulation, EDF – Corporate Strategy
Jean-Jacques Nieuviaert, Economy and Markets Advisor, UFE
Patrice Geoffron, Research Professor at the Université Paris-Dauphine
Aline de Salinelles, Director of the Paris-Dauphine Partnership Foundation
Jean-Arnold Vinois, Honorary Director of the European Commission and Special Advisor to the Commissioner Oettinger
Alfred Voss, CEEM Scientific Council President, Institute for Energy Economics at the University of Stuttgart
Fatoumata Diallo, CEEM Coordinator

The Scientific Director presented the activities of the CEEM on the basis of the 2013 Annual Report, which was also distributed to the Steering Committee. The following topics were reviewed: public seminars and conferences, internal seminars, doctoral research, publications, and CEEM Working Papers.

The Steering Committee approved of the Chaire's visible efforts and highlighted their interest in these topics. The Committee made recommendations for the following year: 1) The seminar subjects should focus more on economic analysis and less on a political vision of the industry, 2) The CEEM should increase the number of doctoral students as well as its participation in collaborative research projects. The Scientific Director was asked to explore options for participating in European programs.

Patrice Geoffron informed the Committee of his participation in the "Smart Grids France" working group, whose objective is to define a road map for a regulatory framework based on the collective experiences of pilot plants. This activity falls under the scope of Research Axis 3.

Jean-Arnold Vinois suggested that the CEEM give more explicit recognition of the constructive role of the

European Commission in the organization of European electricity markets. In response, the Scientific Director confirmed that the European Commission is an important partner and participates regularly in CEEM seminars. He hopes to reinforce this dialogue in the future.

Finally, the Committee applauded the participation of Professor Alfred Voss as President of the CEEM Scientific Council.

Steering Committee Meeting of 8 October 2014, from 10:00 to 13:00, at the Université Paris-Dauphine, Room A 707 (7th floor, New Wing)

Participants : Jan Horst Keppler, Audrey Mahuet (Head of Market Design and Customer Relations, EPEX SPOT), representing Jean-François Conil-Lacoste (Chairman of the Management Board, EPEX SPOT), with the voting rights of RTE, Marc Bussieras (EDF), Patrice Geoffron, Véronique Deborde (Assistant Director of the Paris-Dauphine Partnership Foundation), Jean-Arnold Vinois, Dominique Finon (Observer), Fatoumata Diallo

The Scientific Director presented the activities of the CEEM on the basis of the 2014 mid-year report, which was also distributed to the Steering Committee. The following topics were reviewed: public seminars and conferences, internal seminars, the progress of doctoral students, publications, CEEM Working Papers, and the outcome of the CEEM researchers' meeting (held on 30 September 2014 from 15h00 to 17h00 at the Université Paris-Dauphine, Décanale room).

The Scientific Director informed the Steering Committee that the CEEM planned to hire two research assistants from the Energy, Finance, and Carbon Master program at the Université Paris-Dauphine. These positions are CDD contracts running from 1 November 2014 to 31 March 2015. The goal is to develop two new research projects. The first is a cost-benefit analysis of the optimal number of electrical interconnections between the major European electricity markets, and will be conducted by Alexandre COQUENTIN (a civil service student intern from École Normale Supérieure de Cachan). The second is the preparation of a background paper for the "Target Model 2.0" CEEM conference in spring 2014.

The members of the Steering Committee were invited to give their views on the different CEEM work areas. First, the Committee approved the Scientific Director's proposal to host the CEEM Scientific Advisor, Dominique Finon, as an observer. The Committee approved of the Chaire's continued efforts and its choice of topics, which are highly relevant to current events in the sector, as well as its increased visibility and recognition. EPEX SPOT informed the Committee that they are willing to host CIFRE doctoral candidates if needed.

Véronique Deborde informed the Committee that the Paris-Dauphine Partnership Foundation has established a global partnership with the Caisse des Dépôts & Consignations (CDC). In this context, the CDC has demonstrated interest in the CEEM research topics proposed by the Scientific Director, and the 2013 Annual Report was provided to give more information on the work in progress. The Committee gave their approval of this partnership on the condition of a genuine convergence of research topics between the CDC and the CEEM. They requested a more in-depth analysis of the proposed research topics and await the response of Jan Horst Keppler regarding the progress of project discussions. Jan Horst Keppler participated in a discussion with the CDC on Tuesday 9 December 2014 concerning the research priorities of the CEEM and the CDC.

Finally, the Committee approved the planned upcoming events of the CEEM.

II. Scientific Council

In addition to the Steering Committee, whose formation is prescribed by the partnership Charter, the CEEM also has a Scientific Council. This Council consists of high-level researchers who define the main areas of research and ensure that a high standard of methods and protocols are followed. The Scientific Council is composed of the following members:

- Prof. Alfred Voss, Institute for Energy Economics (University of Stuttgart), Scientific Council President
- Prof. William D'Haeseleer, University of Leuven Energy Institute
- Prof. David Newbery, Electricity Policy Research Group (Cambridge University)
- Prof. John E. Parsons, Centre for Energy and Environmental Policy Research (MIT)
- Prof. Jacques Percebois, CREDEN (University of Montpellier)
- Jan Horst Keppler, CEEM Scientific Director
- Anna Creti, CEEM Research Axis 1 Director
- Dominique Finon, CEEM Research Axis 2 Director
- Patrice Geoffron, CEEM Research Axis 3 Director

Scientific Council Meeting of 24 March 2014, from 10:00 to 12:00, at the Université Paris-Dauphine (Space One)

Participants:
Alfred Voss, Institute for Energy Economics (University of Stuttgart)
Jan Horst Keppler, CEEM Scientific Director, Université Paris-Dauphine
William D'Haeseleer, University of Leuven Energy Institute
David Newbery, Electricity Policy Research Group (Cambridge University)
John Parsons, Centre for Energy and Environmental Policy Research (MIT)
Anna Creti, CEEM Research Axis 1 Director, Université Paris-Dauphine
Dominique Finon, CNRS Research Director, CEEM Research Axis 2 Director
Patrice Geoffron, CEEM Research Axis 3 Director, Université Paris-Dauphine
Fatoumata Diallo, CEEM Coordinator, Université Paris-Dauphine
Silvano Domergue, Director, Center for Market Models and Economic Studies, RTE
Jonas Tornquist, Head of Economics and Regulation, EDF – Corporate Strategy
Audrey Mahuet, Head of Market Design and Customer Relations, EPEX SPOT
Jean-Jacques Nieuviaert, Economy and Markets Advisor, UFE

The Scientific Director presented the activities of the CEEM on the basis of the 2013 Annual Report, which was also distributed to the Scientific Council. The following topics were reviewed: public seminars and conferences, internal seminars, the progress of doctoral students, publications, and CEEM Working Papers.

The Scientific Director took the opportunity to present the growing activity of the Publication Review Board in the CEEM program for incentivizing research. The members of the Scientific Council were invited to give their views on the different CEEM work areas, as well as possible future research projects on European electricity markets. The discussion was centered on the multi-dimensional nature of the electricity sector which requires a multitude of markets and incentive systems to adequately compensate each service provider. Therefore, the Council advised that an important research topic would be the distinction between market-based and administrative solutions. In this context, the Council proposed the following topics for CEEM research:
1. Designs for a complete set of markets and/or incentive systems in view of a more systematic remuneration for the different services provided in an integrated electricity system. This task might include fundamental questions such as: a) To what extent are electricity markets capable of generating sufficient levels of security supply, and b) Is central control of the system required, and if so, to what extent?
2. Incentives for long-term investment in capacity and the electricity mix.

The Council is also interested by the CEEM Working Papers and publications, and has encourage this scientific production, as well as its visibility and accessibility, particularly to young researchers. To this end, the Council has recommended:
1. The creation of bibliometric statistics, such as the number of downloads of each Working Paper and publication,
2. The creation of electronic indexing of Working Papers and publications with digital repositories such as IRSSN, ResearchGate, JSTOR, etc.

In the context of CEEM-organized events, partnerships, and institutional development, the Council highlighted the importance of encouraging interactions between doctoral candidates from the CEEM and international institutions such as MIT and Cambridge, namely through the funding of short exchange trips regarding CEEM Research Axes.

In addition, the Council recommended:
1. The development and reinforcement of collaborations between economists and engineers in the CEEM Research Axes;
2. The exploration of possible collaborations with other institutions such as École des Mines, University of Leuven, or University of Stuttgart (within the context of European framework contracts).

III. Implementation Committee

III. Meeting of 10 February 2014, from 9:30 to 12:00, at the Université Paris-Dauphine, Décanale room, 5th floor, C 518

Participants:
Marc Bussieras, EDF
Anna Creti, Université Paris-Dauphine
Michel Cruciani, Université Paris-Dauphine
Fatoumata Diallo, CEEM Coordinator
Silvano Domergue, RTE
Dominique Finon, CEEM Scientific Advisor
Patrice Geoffron, Université Paris-Dauphine
Jan Horst Keppler, CEEM Scientific Director
Audrey Mahuet, EPEX SPOT
Audrey Zermati, UFE
Philippe Vassilopoulos, EXPEX SPOT

The Committee members approved of the events organized by the CEEM. They also highlighted the need to make the products of the innovative workshops more visible in the media.

The Committee members noted the Scientific Director's nomination of Anna Creti (Professor of Economics, Université Paris-Dauphine) as Director of CEEM Research Axis 1: Econometrics and the price of electricity.

The Committee members also noted the addition of Stéphane Goutte (Assistant Professor of Applied Mathematics and Economics, University of Paris 8) to the CEEM research team.

IV. CEEM Researchers

IV. CEEM Researchers' Meeting of 30 September 2014, from 15:00 to 17:00, at the Université Paris-Dauphine (Décanale Room)

Participants : Anna Creti, Michel Cruciani, Guillaume Dezobry, Fatoumata Diallo, Dominique Finon, Patricia Van Horn Florin, Patrice Geoffron, Yuanjing Li, Jan Horst Keppler, Marie Petitet, Antoine Verrier, Manuel Villavicencio, Julie Hyun Jin Yu.

Information on CEEM activities and the presentation of the 2014 mid-year report: The Scientific Director presented the activities of the CEEM on the basis of the 2014 mid-year report, which was also distributed to the researchers. The following topics were reviewed: public seminars and conferences, internal seminars, doctoral research, publications, and CEEM working papers.

Feedback on workshops: The researchers approved of the CEEM's research topics as being highly relevant to current events in the sector. Jan Horst Keppler and Dominique Finon informed the researchers that they are regularly invited to conferences to speak on behalf of the CEEM.

Operations of the CEEM: The Scientific Director announced that Guillaume Dezobry (Assistant Professor of Law at Amiens, attorney at law, and expert in energy law) joined the CEEM research team. Because of his particular expertise in dealing with local authorities on the subject of capacity mechanisms and smart grids, he is affiliated with CEEM Research Axis 3 (Transport, Distribution, and Demand), directed by Patrice Geoffron. Maria-Eugenia Sanin (Assistant Professor in Economic Sciences since September 2014 at the University of Evry) joined CEEM Research Axis 1 (Econometrics of Energy Pricing) led by Anna Creti. Her most recent projects analyzed the Italian electricity market and the outcomes of electricity market regulation in Brazil.
Yuanjing Li recently joined the CEEM research as a doctoral student of Anna Creti. Patrice Geoffron informed the research team that Cédric Clastres (assistant professor at University Pierre Mendès-France, 2010-2015, Economics UFR) would be interested in working with the CEEM. His research focuses on the Economics of electricity network industries and the regulatory developments accompanying the deregulation of gas and electricity markets. He is also analyzing the challenges of incentivizing the development of renewables, as well as the impact of adding distributed production renewables to electricity networks (particularly in terms of system services).

Stimulating communication between doctoral students and researchers: The doctoral students volunteered to organize meetings with CEEM researchers to learn more about their projects. They also expressed an interest in meeting with the doctoral students of the Chaire of Climate Economy, headed by Christian Deperthuis.

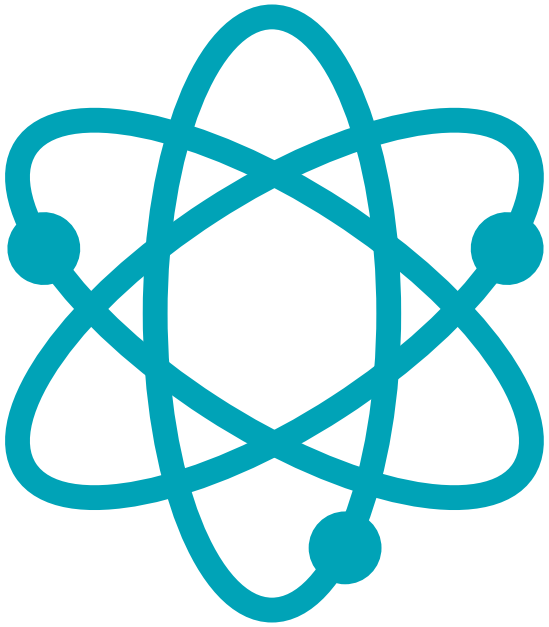
V. Publication Review Board

The CEEM Publication Review Board is tasked with analyzing, commenting, and approving articles which are submitted in the context of the CEEM research stimulus program. This work requires considerable effort from the Publication Review Board and the CEEM is appreciative of this contribution to daily functioning.

The Publication Review Board is composed of the following members:

- Marc Bussieras, Head of Economy, Corporate Strategy and Prospective, EDF
- Silvano Domergue, Director of the Center for Market Models and Economic Studies, RTE
- Patrice Geoffron, Research Professor at the Université Paris-Dauphine
- Jan Horst Keppler, CEEM Scientific Director
- Yannick Le Pen, Researcher
- Audrey Mahuet, Head of Market Design and Customer Relations, EPEX SPOT
- Jean-Jacques Nieuviaert, Economy and Markets Advisor, UFE
- Thomas Veyrenc, Markets Department Director, RTE

The CEEM and its Publication Review Board strongly encourage CEEM researchers to take advantage of the research stimulus program. During 2014, the Publication Review Board was asked to review the Scientific Director's proposal to add several articles written by CEEM researchers. A total of 7 articles were presented and approved by the Publication Review Board, and qualified for the research stimulus program. These comprise the CEEM Working Papers.



PART 3

SCIENTIFIC PRODUCTION

In the context of its research stimulus program, the CEEM allows all researchers and their doctoral students to circulate their research results for internal peer review and to make them more accessible to the greater public. All papers must concern research on European electricity markets.

I. Working Papers

In 2014, the Working Papers gained momentum and the CEEM strongly encourages all of its researchers to use this mechanism. This year, seven working papers were accepted by the Publication Review Board. The majority of these papers are available only in English.

A. Assessing long-term effects of " Demand Response " policies in wholesale electricity Markets, May 2014, by Mauricio Cepeda (CEEM Researcher) and Marcelo Saguan (Microeconomix)

Abstract: This paper deals with the practical problems related to long-term issues in electricity markets in the presence of demand response development. Different policies have been implemented around the world aiming to develop demand response potential. Externalities, in particular the CO2 externality, have been one of the key elements in the debate on the effectiveness of different policies regarding demand response development. Policy makers have several options to deal with this externality. The most direct one is to correct the externality by setting a CO2 price at a level that corresponds to the cost to society of the corresponding CO2 emissions. One alternative solution could be to subsidize carbon-free technologies as demand response. In this paper we examine potential long-term impacts of these two policies. We rely on a long-term market simulation model that characterizes expansion decisions in a competitive regime. We test for each policy two different scenarios regarding the possibility of internalization of the CO2 externality. The results show that differences in development policies affect both investments and social costs in the wholesale electricity market and confirm previous findings that a market-driven development of demand response with the internalization of the CO2 externality is the most efficient approach.

B. Capacity mechanisms and cross-border participation: the EU wide approach in question, July 2014, by Dominique Finon (CEEM Scientific Advisor and CIRED-CNRS)

Abstract: A capacity remuneration mechanism (CRM) which excludes cross border participants is considered to have serious distortive effects on long term competition, compared to explicit cross border participation (CBP), on the grounds that it doesn't capture the advantages of multi-system competition. This paper examines the reality of these advantages by distinguishing situations with and without congestion between systems during critical periods because congestion separates markets and their collective goods of reliability and adequacy for each system, and suppresses any economic and physical relevance of a capacity commitment from a new external participant to a CRM. From the limited perspective of any single system, there are two potential advantages of explicit CBP: the first is the supplement of the set of committed capacities to a CRM; the second is the lower cost of the adequacy policy of the system, thanks to enlarged competition, but it is illusory because the clearing price of capacity is the same with and without explicit CBP. Moreover concretization of such benefits for the system is not possible when there is congestion. From the EU wide perspective, we identify some potential gains of social efficiency from explicit CBP at the multi-system level, when we have systems with a long standing situation of overcapacity beside systems with tight situations during their critical periods; or when there exists projects of hydro equipment (pumping storage, etc... But again, congestion removes any sense to any additional

revenue to them. In any case erratic revenues certainly do not steer new investment towards either system. Furthermore exchanges of capacity rights between systems equipped with different CRMs introduce a supplement of distortions compared to the same situation with implicit CPB and no trade of capacity rights. It is problematic in the case of congestion; this delays the price signal of capacity scarcity in the system with the least attractive CRM in terms of revenue and risk management.

C. The impact of intermittent renewable production and market coupling on the convergence of French and German electricity prices, by Jan Horst Keppler (Professor of Economics, Université Paris-Dauphine and Chaire EEM), Yannick Le Pen (CEEM Researcher), Sébastien Phan and Charlotte Boureau (former CEEM research assistants)

Abstract: Interconnecting two adjacent areas of electricity production generates benefits in combined consumer surplus and welfare by allowing electricity to flow from the low cost area to the high cost area. It will lower prices in the high cost area, raise them in the low cost area and will thus have prices in the two areas converge. With unconstrained interconnection capacity, price convergence is, of course, complete and the two areas are merged into a single area. With constrained interconnection capacity, the challenge for transport system operators (TSOs) and market operators is using the available capacity in an optimal manner. This was the logic behind the "market coupling" mechanism installed by European power market operators in November 2009 in the Central Western Europe (CWE) electricity market, of which France and Germany constitute by far the two largest members. Market coupling aims at optimizing welfare by ensuring that buyers and sellers exchange electricity at the best possible price taking into account the combined order books all power exchanges involved as well as the available transfer capacities between different bidding zones. By doing so, interconnection capacity is allocated to those who value it most. Currently markets are coupled on the basis of available transfers capacity (ATC), i.e. commercially available transmission capacity once otherwise reserved capacities such as network safety margins or capacities already reserved through long-term contracts have been deducted from physically available total transfer capacity (TTC). In the future, European electricity markets operated by EPEX Spot will be coupled through so-called flow-based market coupling. The latter will go beyond the simple optimization of available interconnection capacities but will also integrate and optimize "loop flows", the passage of bilateral electricity flows through third countries, independent of the latter's own prices. This will allow for even finer optimization of overall available interconnection capacity but can in certain cases lead to counter-intuitive flows such as exports from a high-price country to a low-price country.

D. First principles, market failures and in-built obsolescence: The dynamic approach to capacity mechanisms, by Jan Horst Keppler (Professor of Economics, Université Paris-Dauphine and Chaire EEM)

Abstract: The theoretical benchmark model arguing that competitive energy-only markets with VOLL pricing can provide sufficient levels of capacity is a coherent starting point also for discussions about capacity remuneration mechanisms (CRMs). Two types of market imperfection, both stemming from the non-storability of electricity and the resultant inelasticity of demand, however require qualification of the benchmark model and can justify CRMs. The first type of market imperfection relates to the existence of security-of-supply externalities as involuntary curbs on demand under VOLL-pricing create disutility beyond the private non-consumption of electricity. In interconnected economies, utility does not only depend on individual electricity consumption but also on the smooth consumption of others. These externalities are captured in the difference between voluntary and involuntary demand response. The second type of market imperfection relates to the asymmetric incentives for investors under imperfect information. Due to the inelasticity of demand and the lumpiness of generating equipment, investors in markets for non-storable goods will err on the side of caution, underinvesting at the margin rather than overinvesting. There exists thus not an intrinsic, general case but a time- and context-specific case for CRMs depending on the shape of the load-curve, the elasticity of demand and the availability of flexibility resources. The choice of mechanism will depend on the number of hours of potential capacity short-falls and the resulting capital-intensity of the technologies most apt to respond to them. Most importantly, well-designed CRMs will set in motion the very structural dynamics towards more elastic demand, a development that might one day make them obsolete and render the theoretical benchmark model applicable again. CRMs thus require transparent and pre-announced review mechanisms at regular intervals.

E. Carbon price instead of support schemes: Wind power investments by the Electricity Market, by Marie Petitet (doctoral student, CEEM, RTE), Dominique Finon (CEEM Scientific Advisor and CIRED-CNRS) and Tanguy Janssen (Head of Market Studies, Center for Markets and Economic Studies-Department of Markets, RTE)

Abstract: In this paper we study the development of wind power by the electricity market without any usual support scheme which is aimed at subsidizing non mature renewables, with the sole incentive of a significant carbon price. Long term electricity market and investment decisions simulation by system dynamics modelling is used to trace the electricity generation mix evolution over a 20-year period in a pure thermal system. A range of stable carbon price, as a tax could be, is tested in order to determine the value above which wind power development by market forces becomes economically possible. Not only economic competitiveness in terms of cost price, but also profitability against traditional fossil fuel technologies are necessary for a market-driven development of wind power. Results stress that wind power is really profitable for investors only if the carbon price is very significantly higher than the price required for making wind power MWh's cost price competitive with CCGT and coal-fired plants on the simplistic basis of levelized costs. In this context, the market-driven development of wind power seems only possible if there is a strong commitment to climate policy, reflected by the preference for a stable and high carbon price rather than a fuzzy price of an emission trading scheme. Besides, results show that market-driven development of wind power would require a sky-rocketing carbon price if the initial technology mix includes a share of nuclear plants even with a moratorium on new nuclear development.

F. Market structure and electricity demand management, by Fabien Roques (Visiting Professor, CGEMP, Université Paris-Dauphine, CEEM member and consultant at Compass Lexecon) and Vincent Rious (Vice President of Regulation, Microeconomix)

Abstract: The development of load management is a central problem in environmentally friendly electricity markets. The lack of market structures providing proper incentives has limited the development of load management in most electricity markets. In Europe, different development models are being considered for load management, from a regulated system to a competitive market. In this paper, we focus on the load management of small and medium consumers and analyze which types of market signals should be sent to load aggregators to ensure competitive behavior. Using simulation results from based on eight years of French electricity network data, we evaluate the ability of different market structures to stimulate the competitive development of load management. Our simulations show that under current market regulation, load management is not a profitable activity in the French electricity industry. The introduction of a capacity mechanism could bring supplementary revenue to load management aggregators, as long as the system does not have overcapacity and its structure does not penalize load management.

G. Costs associated with the addition of intermittent renewables to the electrical system – a literature review, by Fabien Roques (Visiting Professor, CGEMP, Université Paris-Dauphine, CEEM member and consultant at Compass Lexecon) and Renaud Crassous (Economist, Corporate Strategy and Prospective, EDF)

Abstract: The technologies for electricity production are subject to variations, including periods of forced interruption. The addition of large intermittent renewables to the system brings about new questions concerning adaptation and the costs associated with maintaining the same level of quality (in terms of voltage and frequency) and reliability (outages). The objective of this paper is to draft a review of the literature available on the costs associated with the addition of intermittent renewables in the electricity system.

II. Peer-reviewed publications

Certain CEEM Working Papers or Publication Review Board-approved papers are intended for publication in peer-reviewed journals. In 2014 three Working Papers and one article were published.

A. The impact of intermittent renewable production and market coupling on the convergence of French and German electricity prices, By Jan Horst Keppler, Sébastien Phan, Yannick Le Pen and Charlotte Boureau, submitted for publication in Energy Policy

B. Carbon price instead of support schemes: wind power investments by the electricity market, by Marie Petitet, Dominique Finon and Tanguy Janssen, submitted for publication in Energy Policy

C. Market structure and electricity demand management, by Fabien Roques and Vincent Rious, submitted for publication in the review Économie Industrielle

D. The need for flexible markets : Adapting the design of electricity markets to the production of renewable energy, by Dominique Finon (CEEM Scientific Advisor, and CIRED-CNRS), published in Revue de l'Énergie n°622

Abstract: Intermittent renewables (wind and solar) are predicted to be major contributors to production in certain European electricity markets. The variability of their contribution makes the physical balance of the system a difficult challenge. Aside from the necessary technical upgrades, improving the system requires transformations in two main areas. The operation of the different energy markets (day-ahead and intra-day) and reserves, as well as in overall operation. Progress is also needed in attracting investment in flexible supplementary resources (thermal energy, load management, and storage). However, the value of flexible resources is not properly appreciated in current markets. The adjustment market is not an optimal solution for the proper valuation of the rarity of flexible resources. The other challenges concern the definition of flexible products unsuited to dealing with high contributions from renewables and the lack of compensation for certain flexible-resource services due to lack of harmonization. Markets must therefore be improved to complement the current offers in flexible resource services and create demand by empowering renewables-based producers.

PART 4

SCIENTIFIC CONFERENCES

I. Conference: What Economics Models and Regulatory Tools Are Relevant for Smart Grids?

24 January 2014, Université Paris-Dauphine, Room Raymond Aron

This conference on regulation and economic models of smart grids was based on the finding that while many European pilot plants have helped solve technical problems, the question of " marketing " these solutions remained open for the second half of the decade. Therefore, the next step in these deployments is the identification of sustainable economic models and the development of better regulatory tools.

After an introduction designed to present the changes induced by the transformation of distribution networks into "information platforms", the seminar was organized into three sections:

1- Feedback from French experiments in pilot smart grids, based on observations compiled by the "Smart Grids France" network from about 40 projects with the goal of identifying the regulatory expectations of participants.

2- The presentation of the theoretical basis of regulatory guidance and the first results of a large consultation of the Energy Regulation Commission.

3- The presentation of different types of services likely to be deployed in the context of smart grids (such as storage and electric vehicles) and criteria for their economic valuation.

The conference drew 150 participants and many positive reviews, and allowed us to identify important issues requiring further analysis.

II. Seminar with John E. Parsons (MIT), A Dynamic Model for Risk Pricing in Generation Investments

21 March 2014, Université Paris-Dauphine, Room Raymond Aron

Abstract: The past number of years has seen significant interest in the role of risk in the valuation of electricity generating technologies. Companies are keenly aware that different projects contain different levels of risk, that project risk may vary throughout the project life-cycle, and that the contract terms negotiated for a specific project shift the risk dramatically. Policy makers, too, have looked to shape the risk of certain investments in order to steer the profile of new generation towards low carbon sources. Unfortunately, this heightened interest has not been matched with adequate tools for properly evaluating different risk profiles. One approach leans on the now widespread availability of computing to generate large Monte Carlo distributions of payoffs to different assets or for the same asset financed with different contract. Usually the different distributions are compared on the basis of means and variances. Unfortunately, this approach ignores the key insight of asset pricing, which is that expected return is not a function of total variance, but rather of the component of variance that is correlated to macroeconomic variables. This literature is disconnected from the modern asset pricing literature. The proposed model resolves this weakness, showing how to incorporate standard risk pricing tools in order to evaluate different electricity generating technologies or different market and contracting structures. These standard risk pricing tools are known by various terminology: the stochastic discount factor, contingent claims analysis, real option valuation, and so on. When risk profiles satisfy certain simple assumptions, the tools reduce to the familiar discounted cash flow using a risk-adjusted discount rate derived from the CAPM. But the tools are flexible and also work when these assumptions do not apply.

Unfortunately, for various reasons these tools are not yet widely employed by financial and policy analysts working in the power industry. This paper is intended to help remedy that.

Professor John E. Parsons (MIT) is a financial economist specializing in risk management, corporate finance and valuation. His current research focuses on the problems of risk in emissions markets—including the design of a US carbon market—risk in oil, natural gas and wholesale electricity markets, the role of trading operations in an energy company, and the valuation and financing of investments in energy markets. At MIT's Sloan School, he teaches the finance elective Advanced Corporate Risk Management. He is also the Executive Director of MIT's highly regarded Centre on Energy and Environment Policy Research (CEEPR).

III. Seminar around The European Electricity System in Crisis: the Ways Forward

03 April 2014, Université Paris-Dauphine, Room Raymond Aron

Abstract: The construction of an integrated and liberalized electricity market and the adoption of an ambitious Climate and Energy Package are the two cornerstones of the EU energy strategy. The original idea was that the European electricity market would lower electricity prices for end-users due to greater competition following market liberalization. In addition the Climate and Energy Package would reduce greenhouse gas emissions, integrate renewable energy sources at a large scale and improve energy efficiency. Reality turned out differently. The European electricity markets are in crisis. The overlap of climate and energy policies leads to a collapse of the carbon price and no longer provides incentives to invest in low carbon technologies. In particular, the support for renewables (RES-E) undermines the long term coordination of investment decisions in the market. Reduced wholesale prices and load factors have not only made investment in conventional power stations highly risky, but also made problematic the recovery of fixed operating costs of existing units which are closing. In addition, policy instruments are self-reinforcing: the more RES-E are deployed, the more low and volatile wholesale prices will be unable to guarantee fixed cost recovery. As each member-state addresses market failures relating to the security of supply, congestion management or network expansion through their own instruments, European electricity markets move further from equilibrium.

In this situation, the CGSP invited some well-known European energy economists, among whom Marc Oliver Bettzüge, Director of the Energy Economics Institute of the University of Cologne, and Fabien Roques, Senior energy consultant and Associate professor of Economics at Université Paris-Dauphine to put forward their recommendations to restore the viability of European electricity markets. These include limiting environmental objectives to GHG targets, substitution of feed-in tariffs with market compatible support mechanisms for small renewable units, and the facilitation of long-term contracts for low carbon electricity generation, to institute capacity markets and increase interconnections. While most experts would support such rationalization of policies, the question is whether the proposed measures will be sufficient to restore the function of long term coordination to the market or whether more fundamental changes will be required. This CEEM seminar provided an opportunity to present and discuss the CGSP report with a broader constituency of European electricity market experts.

IV. Workshop on Electricity Price Forecasting

28 April 2014, Université Paris-Dauphine, Room A 709, 7th Floor

Abstract: This half-day conference gathered academic and practitioners working on short-run forecasting of electricity prices. Forecasting electricity prices is challenging due to the specific properties of electricity prices. Electricity prices display high volatility, extreme values and strong seasonality. In that conference, several solutions had been presented to deal with these issues: forecast combinations, nonlinear models, multivariate models exploiting the intra-day relationships of prices and quantile regressions. The first paper by Eran Raviv (APG Asset Management N.V., Amsterdam-The Netherlands) showed how intra-day data could improve the forecasts of the daily average price. This paper contributed to the debate on how to consider hourly electricity prices (time series, separate process, variable to be directly modeled). The second presentation by Rafal Weron (Professor of Economics at the Institute of Organization and Management-Wroclaw University of Technology) provided an extensive survey of the modeling approaches to forecast electricity prices at various horizons, focusing on the suitability of combined models. On the practitioners'

side, the third paper by Aymen Salah Abou El-Enien (Quantitative Market Analyst at EPEX SPOT France) presented the model adopted by EPEX SPOT France to forecast day-ahead spot prices. This model includes a set of simple variable, like climatic variables and day of week, in order to get a reliable forecast. EPEX Spot conducts such kind of analysis in order to obtain some "warning threshold" that triggers a second day-ahead auction, needed if the value of electricity prices is not close enough to fundamentals. Some issues on the discrepancy between the volatility of day ahead prices and retail tariffs had been presented by Eurelectric. The last presentation focused on the comparisons of three methods, such as quantile regression, CAViaR models and fully parametric location-scale models. The presentation showed how quantile regressions could be useful to deal with the changing pattern of price distributions due to more competitive markets and more renewable energy.

The workshop gave an overview of econometric research on electricity prices, a dynamics field offering several future research options.

V. Workshop on Drifting Apart: Costs, Prices and Tariffs in EU Electricity Markets

09 July 2014, Université Paris-Dauphine, Room Raymond Aron

Abstract: The costs of generating electricity in Europe are increasingly de-correlated from wholesale prices in European power markets. The costs of thermal generation are stable or increasing and while renewable technologies have seen some decline in their capital costs, they are still not cost competitive. However, due to massive subsidization mainly in the form of feed-in tariffs, wind and solar PV now provide increasing amounts of electricity, which due to their low marginal costs exert downward pressure on prices in electricity wholesale markets. Average prices in the Franco-German EPEX Spot day-ahead market are now 50 % below their level in 2008. This has serious impacts on investment, security of supply and plant availability. During the past two years, around 30 GW of gas-fired generation capacity have shut down as wholesale prices no longer cover fixed operating costs, let alone financing charges. Electricity retail prices which include the cost of electricity production, the added costs for RES-E support as well as the costs for new investments in transportation and distribution grids, have the increasingly difficult task to provide electricity companies with the revenues they need while remaining at socially and politically sustainable levels. In general, retail tariffs are today significantly above wholesale market prices but significantly below the full costs of electricity generation. This is the result of a distorted wholesale market as well as of politics, as several European countries including France, have maintained regulated tariffs below costs for political reasons. Facts, however, are tenacious. One can hide rising costs only for so long. Either generators revenues will have to rise or European electricity systems will have to learn to live with permanently lower levels of investment and hence decreased security of supply.

The situation is further complicated by a number of factors:

- Long lead-times for investment and the long lifetimes of generation equipment make cost accounting difficult. So investment short-falls resulting from too low wholesale prices may display their full effects only with a lag of several years.
- The subsidized costs of renewable energy do not show up in wholesale prices but are borne by certain customer groups through an out-of-market levy. This can cause important distributional effects between different industries and households.
- The intermittency of wind and solar PV causes a number of additional costs at the system level for investment in distribution, transport, and new back-up equipment as well as for balancing in the operation of the system. These costs are currently borne by TSOs, DSOs and consumers, but not by the producers of variable electricity who generate them.
- Current carbon prices do not promote investment in low carbon equipment. Currently, the only manner to trigger investment in capital-intensive low-carbon technologies is through feed-in tariffs or long term contracts such as the proposed CfDs in the UK electricity market. This further weakens the price signal of wholesale market for adequate levels of capacity.

In this situation, the CEEM organized an international workshop on the costs, wholesale prices and retail tariffs for electricity. It brought together experts from academe, industry, regulators and international organizations to discuss the potential dangers of the current disconnect between energy prices, operators' revenues and costs as well as some possible solutions, which include capacity remuneration mechanisms (CRM) to complement the revenues of generators and ensure security of supply.

VI. Workshop on Changing Renewables Support in the EU Electricity Markets

14 October 2014, Université Paris-Dauphine, Room Raymond Aron

Abstract: Policy instruments to promote renewables (RES-E) in the electricity system have been recently re-assessed by a number of EU member states as well as the European Commission. One policy driver of national reforms in Germany, France, and Spain has been the growing concern about the increase in the cost of renewables support policies and the system costs of large scale variable power generation by RES-E. The European Commission's new State Aid guidelines require that by 2016 RES-E support policies need to be reformed in a manner such as to provide better operational incentives for managing RES projects and to expose them to market risk. France is about to follow the Commission's recommendations by adopting a mechanism based on feed-in premiums and auctioning to attribute long term contracts for RES-E projects.

These ongoing reforms of RES support schemes raise a number of issues:

- What are the best instruments among those which are compatible with the new State Aid guidelines?
- Will the new support schemes exposing RES projects to market risk have an effect on renewables projects financing? Will they increase the cost of capital?
- More generally, will these new support schemes affect renewables growth and could they hamper countries in their ability to meet the 2020 RES target?

In this situation, the CEEM organized an international seminar that brought together policymakers, investors and experts from academe and international organizations to discuss the implications of the new guidelines in the fast-changing context of European electricity markets.

VII. Conference on Investing in European Electricity Markets Today: Challenges and Opportunities

24 November 2014, Université Paris-Dauphine, Room Raymond Aron

Abstract: High demand and price volatility, average prices below costs and high regulatory risk – since the inception of liberalized electricity markets in Europe, investing in power generation, has never been so challenging. While many renewable technologies have constituted attractive investment options due to stable fee-in tariffs, recent experiences with ex post tariff adjustments or large off-shore wind projects show that market price may not be the only risk factor holding back investors. At the same time, since 2009, low carbon prices are not providing investors with the incentives to invest in low-carbon technologies.
These developments are taking place in the context of changing legal and institutional frameworks. While the declared objective of the European Commission is still the completion of the internal energy market by the end of 2014 or early 2015, there are signs that the current framework might be adapted significantly. The Communication on state aid for energy of July 2014 foreshadows a move away from feed-in-tariffs in the area of renewables. In parallel, individual countries aim at introducing measures to support investment in dispatchable capacity such as contracts-for-difference for nuclear or capacity mechanisms aimed at gas power stations and demand response. In classic manner, these important developments signal new risks as well as new opportunities to investors.

This half-day conference which was organized jointly by the CEEM of the Université Paris-Dauphine and the HEC Energy & Finance Chair sponsored by Deloitte and Société Générale, brought together academics, energy industry experts and investors to gain better insight of the magnitude of current investment challenges as well as to assess the nature of current and emerging opportunities. The two sessions of the conference on financing production, emerging opportunities and regulatory risk, also aimed at achieving a better understanding of the needs and constraints of different investment communities in terms of timeframes, aversion towards different types of risk and hedging opportunities. Portfolio investors, project developers or bank lenders have different skills, opportunities and priorities.

The conference aimed at confronting their views with those of academics and electricity producers. Two cross-cutting questions introduced the proceedings:

- Are current pressures on returns forcing a change in the capital structure of electricity producers, a process which may include an adaptation of the business model of the vertically integrated utility that has dominated European electricity markets in past decades?
- Are current low levels of investment a result of exogenous, structural forces (e.g. increasing efficiency, low economic growth) or of the institutional particularities of the current European market design? Which regulatory changes may improve the investment climate?

This conference organized jointly by the Chaire European Electricity Markets and the HEC Energy & Finance Chair sponsored by Deloitte and Société Générale, exposed a new model of cooperation between complementary academic institutions. It brought together 120 energy and finance experts to discuss current challenges and solutions for European Electricity Markets. Stability and transparency of energy and climate policy were considered indispensable elements of any future investments framework.

PART 5

INTERNAL RESEARCH SEMINARS

Since 2013, the CEEM has held internal research seminars coordinated by the CEEM Scientific Advisor Dominique Finon to discuss the work of researchers and doctoral students with relevant external stakeholders. Notably, several CIFRE-funded and CEEM Research Axis 3 doctoral students (under the direction of Anna Creti, but not enrolled at the Université Paris-Dauphine) participate regularly in these seminars.
This series of seminars continued in 2014 with the addition of external participants and a larger audience through targeted invitations. Designed from the start to encourage dialogue between CEEM doctoral students and researchers, the seminars expanded to address specialized questions requiring more complex methodology: electricity markets, competition, public policy, etc.

I. Modeling Electricity Markets with System Dynamics

The first seminar, held Thursday 12 December 2013, featured *Modeling Electricity Markets with System Dynamics*. Mauricio Cepeda (Commission de Régulation de l'Énergie, and CEEM researcher) also presented *Assessing long-term effects of demand response policies in wholesale electricity markets*, and Marie Petitet (CEEM doctoral student) presented her paper *Characteristics of long-term modeling in system dynamics.*

II. Econometrics of Electricity Markets for Short-Term Forecasting

The second seminar, held Tuesday 28 January 2014, from 16h30 to 18h30 in room A707 at the Université Paris-Dauphine (7th floor, New Wing), centered on *Econometrics of Electricity Markets for Short-Term Forecasting,* with presentations by Marie Bessec (LEDA-CGEMP and CEEM) on *Forecasting electricity spot prices using time series models with a double temporal segmentation* (an article co-authored with Julien Fouquau and Sophie Meritet), and Faddy Ardian (doctoral student) on *Hourly seasonal ARMA-Garch for short-term forecasting in electricity markets* (an article co-authored with Anna Creti).

III. Modeling the Integration of Electricity Storage in Electricity Markets

The third seminar on *Modeling the Integration of Electricity Storage in Electricity Markets,* held Tuesday 29 April 2014 from 16h00 to 18h00 in room A709 at the Université Paris-Dauphine (7th floor, New Wing), featured three presentations: *Planning and valuating flexibility in electricity systems with highly variable production* by Vera Silva (EFESE department, EDF R&D); *Measuring the value of storage in electricity markets using diverse models: a literature review* by Timothée Hincliffe (EFESE department, EDF R&D); *Optimal integration of storage in electricity systems with highly intermittent production: some starting principles,* by Manuel Villavicencio (CEEM doctoral student).

IV. The Impact of Foreign Capacity in EU Capacity Markets: Conditions and Justifications

The fourth seminar, held 11 June 2014 from 16h00 to 18h00 in room A707, at the Université Paris-Dauphine (7th floor, New Wing), was centered on *The Impact of Foreign Capacity in EU Capacity Markets: Conditions and Justifications.* Dominique Finon (CEEM Scientific Advisor, CIRED-CNRS) and Fabien Roques (Compass Lexecon and CEEM Associate Researcher, the Université Paris-Dauphine) each contributed independently to this topic, which is currently at the top of French and European agendas on capacity mechanisms. The seminar began with an introduction by Gérald Vignal (Head of Medium- and Long-term Markets, RTE) entitled *Open questions on the participation of cross-border capacity in French capacity.* This was followed by *Possible approaches for cross-border capacity participation in capacity markets,* presented by Fabien Roques. Dominique Finon presented *Capacity mechanisms and Cross-border Participation (CBP): The EU-wide approach of explicit CBP in question.* The seminar concluded with a discussion with Charles Verhaeghe (Senior Economist at Compass Lexecon).

V. Do we Need Sub-National Bidding Zones in EU Electricity Markets ?

The fifth seminar, held 16 December 2014 from 16h00 to 18h00 at the Université Paris-Dauphine (Space One) and featured two presentations: *The Jump to Bidding Zones: which necessity in the context of large scale development of variable RES-E in Germany* by Christoph Maurer (Consentec GmbH), and *A cost-benefit analysis of the redefinition of bidding zones in the European electricity markets* by Vincent Rious (Energy Economist, Microeconomix). Philippe Vassilopoulos (Head of product design EPEX SPOT) led a discussion of these two presentations.

Abstract: The seminar hosted by three highly qualified experts on this complex issue discussed advantages and drawbacks of sub-national bidding zones in the West European power market with professional and academic approaches. In the check list of the measures to improve congestion management, the redefinition of bidding zones is the last one in the agenda, after the development of the market coupling for the day-ahead and the intraday, and the flow-based transmission capacity allocation which could be adopted in the next future. It is becoming an important issue in the Central Western European zone (CWE), in particular because in Germany important North-South flows of electricity could lead to internal congestions in the German Electricity Markets. This implies structural overcapacity (mainly wind) in Northern Germany and structural under-capacity in the centers of Electricity demand in Southern Germany. Numerous experts therefore advocate the urgent creation of two separate bidding zones with independent formation of electricity prices in Germany but it will also concern all the CWE in the next future. This radical idea which addresses the fundamental issue of a structural imbalance, runs against a number of important institutional, legal, political and economic hurdles. Benefits of redefinition of bidding zones should be balanced with the costs that it could incur.
The presentations discussed these eventual costs and the way to reduce them: the risk on robustness of definition of the zones, the possible increase of market power (with risk of congestion manipulation), the reduction of liquidity and hedging possibilities in particular.

PART 6

PARIS-SCIENCES-LETTRES RESEARCH SEMINARS – THE ECONOMICS OF ENERGY

The Paris-Sciences-Lettres Research Seminars on the Economics of Energy are jointly organized by the CERNA, CGEMP, CEEM, Mines ParisTech, and the Université Paris-Dauphine. They are led by François Lévêque (CERNA, Mines ParisTech) and Dominique Finon (CEEM, CNRS-CIRED). The goal of these seminars is to present work on several issues in energy Economics research: competition in electricity and gas markets, the role of long-term contracts, energy market econometrics (for electricity, gas, and oil), the effectiveness of energy efficiency and renewable policies, Economics of load management, and the prospective analysis of long-term policies.

Another objective of these seminars is to increase the visibility of these fundamental issues, which have recently been overshadowed by climate change policy debates under the name of "energy transitions".

Two papers are presented at each session, one from a senior researcher, and one from a junior researcher (French or foreign). The seminar is intended not only for researchers, but also professional economists (for example, from energy companies and consultants), as well as civil servants in the sector.

I. 9th session : Analysis of Nuclear Power Cost-Factor Trends

I. 12 February 2014, École Mines Paris Tech, 16:30 - 18:30

Summary of the presentations

1. Nicolas Boccard, University of Girona

The Cost of Nuclear Electricity: France after Fukushima

The Fukushima disaster has lead the French government to release cost information relative to its nuclear electricity program in a novel court of audit report. It allows us to compute the levelized cost of French nuclear power over 40 years using. We include R & D, technology development, fissile fuel, financing cost, decommissioning and the back-end cycle. We find a mild capital cost escalation and a high operation cost driven by a low fleet availability. We identify a modest escalation of capital cost and a larger than expected operational cost. Under the best scenario, the cost of French nuclear power over the last four decades is 59 €/MWh (at 2010 prices) while in the worst case it is 83 €/MWh. On the basis of these findings, we estimate the future cost of nuclear power in France to beat least 76 €/MWh and possibly 117 €/MWh. A comparison with the US confirms that French nuclear electricity nevertheless remains cheaper.

2. Lina Escobar Rangel, Cerna, Mines ParisTech

Nuclear Reactors' Construction Costs: The Role of Lead-Time, Standardization and Technological Progress

The paper co-authored with Michel Berthélemy provides a comparative analysis about nuclear reactors' construction costs in France and the United States. Studying the cost of nuclear power has often been a challenge, because of the lack of reliable data sources, the heterogeneity between countries, as well as the long time horizon which requires controlling for input prices and structural changes. We build a simultaneous system of equation for overnight costs and construction time (lead-time) to control for endogeneity, using expected demand variation as an instrument for construction time. We argue that benefits from nuclear reactor programs' standardization can arise through short term coordination gains or long terms benefits through learning spillovers from past reactors' construction experience, if those spillovers are limited to similar reactors. We find that these spillovers are only significant for nuclear models built by the same Architect-Engineer (A-E). In addition, we show that the standardization of nuclear reactors under construction has an indirect and positive effect on construction costs through a reduction in lead-time. Conversely, we also explore the possibility of learning by doing and find that innovation leads to construction costs increases. This can be explained by the fact that innovation in nuclear technologies has focused on safety improvements, leading to safer, but more expensive reactors.

Speaker: Geoffrey Rothwell, AEN-OCDE
Dr. Geoffrey Rothwell is the Principal Economist at the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (Paris, France).

From 1986 to 2013, he was a Senior Lecturer and the Director of Honors Programs in the Department of Economics, Stanford University, and Associate Director of Stanford's Public Policy Program.

II. 10th session: Towards a Better Integration of European Gas Markets

12 March 2014, Université Paris-Dauphine, 16:30 - 18:30

Summary of the presentations

1. Miguel Vasquez, Economics Institute, UFRJ-Rio and Florence School of Regulation
Designing the European Gas Market: More Liquid but Less Natural by Entry-Exit Zonal Tariff

Designing a gas market is defining how the commodity, the transmission and ancillary services are traded. The European Union has built the commoditization of natural gas through the socialization of several costs of trade. This choice aims at obtaining more liquid markets through the creation of virtual hubs of trade. These virtual hubs ignore most of the network and of the physical gas flows by the creation of entry/exit market zones. Thus the definition of such market zones has tied EU markets inside virtual trading zones (national or sub-national). We show the consequences and the challenges of this European choice, especially at the cross-zone level (often at country cross-border). Once "entry/exit" trade arrangements are preferred, the use of market-based mechanisms for cross-zone decisions like network investments becomes less natural.

2. Hannes Weigt, Assistant-Professor of Energy Economics, Basle University
Removing Cross-Border Capacity Bottlenecks in the Network of European Natural Gas Market: the Need of an Incentive Regulation

The paper proposes a merchant-regulatory framework to promote investment in the European natural gas network infrastructure based on a price cap over two-part tariffs. As suggested by Vogelsang (2001) and Hogan et al. (2010), a profit maximizing network operator facing this regulatory constraint will intertemporally rebalance the variable and fixed part of its two-part tariff so as to expand the congested pipelines, and converge to the Ramsey-Boiteaux equilibrium. We confirm this with actual data from the European natural gas market by comparing the bi-level price-cap model with a base case, a no-regulation case, and a welfare benchmark case, and by performing sensitivity analyses. In all cases, the incentive model is the best decentralized regulatory alternative that efficiently develops the European pipeline system.

III. 11th session: Redistribution Effects of Energy Transition Policy

09 April 2014, École Mines Paris Tech, 16:30 - 18:30

Summary of the presentations

1. Karsten Neuhoff, Professor, DIW Berlin (Disponible en Anglais exclusivement)
Distributional Effects of Energy Transition: Impacts of Renewable Electricity Support in Germany

The discussion of the support for renewable energy must consider the distributional impact of cost allocation. The public is sensitive to social imbalances caused by rising power prices that might jeopardize the acceptance of energy transformation. By the end of 2012 about 19 percent of German power is produced with renewables other than hydropower. As a result, German consumers will pay for global learning investment through their electricity bill. We explore the distributional implications for households using household micro data. The effect is more significant for poor households, which allocate 4.5% of expenditure for power. We propose three options how to address this distributional impact: adjusted transfers, reduced electricity taxes, and, most effectively, support to improve energy efficiency.

2. Claude Crampes, Professeur émérite Toulouse School of Economics et IDEI
Tarif progressif, efficience et équité ; Redistribution et distorsions tarifaires

L'objectif est de déterminer les caractéristiques d'une politique tarifaire équitable pour l'électricité, conditionnelle à l'information dont dispose l'autorité publique sur les revenus et/ou l'équipement domestique des ménages. Pour cela, nous construisons un modèle de demande dans lequel l'utilité de chaque ménage dépend de sa consommation d'électricité, de ses équipements électriques domestiques et de la consommation agrégée de tous les autres biens. Quand l'autorité connait parfaitement les revenus et les équipements, la redistribution se fait exclusivement par des transferts forfaitaires, par exemple en jouant

sur la partie fixe d'un tarif binôme, sans distorsion du prix du kWh. En revanche, face à une asymétrie d'information, il est optimal de compléter les transferts forfaitaires par une modification du prix du kWh qui va dépendre de l'hétérogénéité considérée (revenus, équipements).

IV. 12th session: Energy Commodities Markets: Risk Analysis and Hedging Strategies for Derivatives Markets

15 May 2014, Université Paris-Dauphine, 16:30 - 18:30

Summary of the presentations

1. Delphine Lautier, Professor, Université Paris-Dauphine
Systemic Risk in Energy Derivative Markets, a Graph-Theory Analysis

Considering it as a necessary condition for systemic risk to appear, we shall focus on integration in energy derivative markets, through a three-dimensional approach: observation time, space and the maturity of futures contracts. Such a method indeed makes it possible to investigate prices shocks in the physical as well as in the paper markets. In order to understand the underlying principles and the dynamic behavior of our prices system, we select specific tools of the graph-theory. More precisely, we use minimum spanning trees as a way to identify the most probable path for the transmission of prices shocks. We study the organization of these trees and their dynamic behavior. Examining three categories of underlying assets (energy and agricultural products, as well as financial assets), we find that crude oil stands at the heart of the system, and that energy markets are becoming more and more integrated.

2. Anna Creti, Professor, CECO, École Polytechnique, and CEEM, Université Paris-Dauphine
On the Links between Volatilities of Stock Market and Commodity Market

We investigate the links between price returns for 25 commodities and stocks over the period from January 2001 to November 2011, by paying a particular attention to energy raw materials. Relying on the dynamic conditional correlation (DCC) GARCH methodology, we show that the correlations between commodity and stock markets evolve through time and are highly volatile, particularly since the 2007-2008 financial crisis. The latter has played a key role, emphasizing the links between commodity and stock markets, and underlining the financialization of commodity markets. At the idiosyncratic level, a speculation phenomenon is highlighted for oil, coffee and cocoa, while the safe-haven role of gold is evidenced.

V. 13th session: Energy Efficiency Gap with Rebound Effect: What Does Econometric Analysis Tell us?

12 June 2014, École Mines Paris Tech, 16:30 - 18:30

Summary of the presentations

1. Erdal Aydin, Research Centre on Sustainability, Tilburg University
Energy Efficiency and Household Behavior: The Rebound Effect in the Residential Sector

A widely acknowledged explanation for the energy efficiency gap between expected and realized energy savings is household behavior, as energy efficiency gains alter the perceived cost of comfort and may thereby generate shifts in consumption patterns. This paper adds to the on-going discussion about the method of identification and the magnitude of the rebound effect, by examining the elasticity of energy consumption relative to a predicted measure of thermal efficiency, using a sample of half million dwellings and their occupants in the Netherlands. The results show a rebound effect of 26.7 percent among homeowners, and 41.3 percent among tenants. There is significant heterogeneity in the rebound effect across households, determined by household wealth and income. The effects are largest among the lower income and wealth cohorts and among households that tend to use more energy than the average household. We then corroborate our findings by applying a quasi-experimental analysis. We document that efficiency improvements following a large subsidy program also lead to a rebound effect of about 56 percent. This finding conforms the important role of household behavior in determining the outcomes of energy efficiency improvement programs.

2. Matthieu Glachant, Professor of Economics, Director of CERNA, Mines ParisTech

The Impact of Energy Prices on Energy Efficiency: Evidence from the UK Refrigerator Market

It is frequently argued in policy circles that imperfect information and other cognitive constraints may lead consumers to discard privately profitable investments in energy efficiency. Using product level panel data from 2002 to 2007 on the UK refrigerator market and a discrete-choice framework, we reject this view: our estimate is that purchasers of refrigerators implicitly discount future electricity costs at a reasonably low rate of 10.5%. As consumers apparently make rational investment decisions, taxing energy would be the route to further increase energy efficiency. However, we make simulations which demonstrate a very small elasticity of energy use to the price of electricity (-0.16). The reason is that most of the energy cost increase is compensated by suppliers through relatively larger price reductions of highly energy consuming products. This finding calls for moving attention in the energy efficiency debate to the pricing behavior of manufacturers of durables.

VI. 14th session: Nuclear New Build: What Costs?

18 September 2014, École Mines Paris Tech, 16:30 - 18:30

Summary of the presentations

1. William D'haeseleer, Professor at the University of Leuven (KU Leuven)

Nuclear Power: Towards a Competitive Low-Carbon, Secure, Stable and Reliable Source of Electricity?

The presentation drew a comprehensive picture of the cost estimations in the nuclear sector, on the basis of available contemporary information in the open literature, so as to establish a coherent background for a discussion on the cost of nuclear-generated electricity. This would provide guidance for an objective context for electricity generation investments. The cost estimates comprise investment costs for new-build Generation-III plants, major refurbishment investment costs for long-term operation of existing plants, normal operational expenses and fuel-cycle costs (including waste management and final disposal) and decommissioning. Particular attention is devoted to the historic investment-cost evolution (mostly cost escalation) and possible future improvements in moving from a "First of a Kind" to routine construction, from analyzing learning/serial/fleet effects. Regarding nuclear accidents, reflections on the liability issue and alleged hidden subsidies are offered. Finally, system-integration effects of future electricity systems (consisting of nuclear plants, dispatchable fossil plants, and renewable sources) are estimated.

2. Geoffrey Rothwell, Principal Economist at OECD Nuclear Energy Agency and former Senior Lecturer, Stanford University

The Assessment of Economic Value of Small Modular Reactors in an Electricity Generating Portfolios

We present a method for estimating the probability distributions of the levelized costs of electricity. These probability distributions can be used to find cost-risk minimizing portfolios of electricity generating assets including Combined-Cycle Gas Turbines (burning natural gas), coal-fired power plants with sulfur scrubbers, and Small Modular Reactors, SMRs. Probability densities are proposed for a dozen electricity generation cost drivers, including fuel prices and externalities costs. Given the long time horizons involved in the planning, construction, operation, refurbishment, and post-retirement management of generating assets, price data from the last half century are used to represent long-run price probabilities. This paper shows that SMRs can competitively replace coal units in a portfolio of coal and natural gas generating stations to reduce the levelized cost risk associated with the volatility of natural gas prices and unknown carbon costs.

Jan-Horst Keppler, Scientific Director of the CEEM and Professor of Economics at the Université Paris-Dauphine, discussed both presentations.

VII. 15th session: Oligopolistic Competition in the Energy Sector

09 October 2014, Université Paris-Dauphine, 16:30 - 18:30

Summary of the presentations

1. Bertrand Villeneuve, Professor, LEDA, Université Paris-Dauphine
Strategic Capacity Investments under Holdup Threats in the Energy Sector: The Role of Contract Length and Width

This paper analyzes the impact of the length of incomplete contracts on investment and surplus sharing. In the bilateral relationship explored, the seller controls the input and the buyer invests. With two-part tariffs, the length of the contract is irrelevant: surplus is maximal and goes all to the seller. If total surplus is targeted, or if sellers are left free, contracts will be as short as possible. If regulators can favor buyers, prohibiting nonlinear pricing and forcing long contracts are the best solutions. The interaction of a restriction (width) with another (length) is explained in detail. Pipelines and large energy equipment are the main examples.

2. Nikolas Wölfing, Centre for European Economic Research ZEW Mannheim
The Effect of Regulatory Scrutiny Asymmetric Cost Pass-through in Power Wholesale and its End

In this paper we find an asymmetric pass-through of European Emission Allowance (EUA) prices to wholesale electricity prices in Germany in the first phase of the EU ETS, which reveals an oligopolistic behavior. More importantly we show that this asymmetry has disappeared in response to a report on investigations by the competition authority. The asymmetric pricing pattern, however, was not detected at the time of the report, nor had it been part of the investigations. Our results therefore provide evidence of the deterring effect of regulatory monitoring on firms which exhibit non-competitive pricing behavior. We do not find any asymmetric pass-through of EUA prices in recent years. Several robustness checks support our results.

VIII. 16th session: Bridging the Efficiency Gap

4 November 2014, École Mines Paris Tech, 16:30-18:30

Summary of the presentation

Kenneth Gillingham, Professor of Environmental and Energy Economics, Yale University
Bridging the Efficiency Gap: Policy Insights from Economic Theory and Empirical Analysis

The failure of consumers to make seemingly cost-effective investments in energy efficiency is commonly referred to as the energy efficiency gap. We review the most recent literature relevant to the energy efficiency gap and in particular discuss what the latest insights from behavioral Economics might mean for the gap. We find that engineering studies may overestimate the size of the gap by failing to account for all costs and neglecting particular types of economic behavior. Nonetheless, empirical evidence suggests that market failures such as asymmetric information and agency problems affect efficiency decisions and contribute to the gap. Behavioral anomalies have been shown to affect economic decision making in a variety of other contexts and are being increasingly cited as an explanation for the gap. The relative contributions of the various explanations for the gap differ across energy users and energy uses. This heterogeneity poses challenges for policy makers, but also could help elucidate when different policy interventions will most likely be cost-effective. If behavioral anomalies can be more cleanly linked to energy efficiency investments, then policymakers will face new challenges in performing welfare analysis of energy efficiency policies.

EU Energy Policy under Debate

12 January 2015 at École des Mines, 16:30-18:30 with Jean-Michel Glachant (Professor at European University Institute and Director of the Florence School of Regulation): *A New Energy Policy for the New European Commission?*

IX. 17th session: Competition in the New EU Gas Markets

10 December 2014, Université Paris-Dauphine, 16:30 - 18:30

Summary of the presentation

1. Michele Polo, Director of the IEFE and Professor of Economics, Bocconi University, Milano
Liberalizing the Gas Industry: Take-or-Pay Contracts, Retail Competition and Wholesale Trade

This paper examines retail competition in a liberalized gas market. Vertically integrated firms run both wholesale activities (buying gas from the producers under take-or-pay obligations) and retail activities (selling gas to final customers). The market is decentralized and the firms decide which customers to serve, competing then in prices. We show that TOP clauses limit the incentives to face-to-face competition and determine segmentation and monopoly pricing even when entry of new competitors occurs. The development of wholesale trade, instead, may induce generalized entry and retail competition. This equilibrium outcome is obtained if a compulsory wholesale market is introduced, even when firms are vertically integrated, or under vertical separation of wholesale and retail activities when firms can use only linear bilateral contracts.

2. Olivier Massol, Economist, Centre d'Économie-Gestion, IFP School
Market Power across the Channel: Are Continental European Gas Markets Isolated from the British Liquid Market?

This paper examines the efficiency of the arbitrages performed between two regional markets for wholesale natural gas linked by a capacity-constrained pipeline system. We develop a switching regime specification to (i) detect if the observed spatial arbitrages satisfy the integration notion that all arbitrage opportunities between the two markets are being exploited, and (ii) decompose the observed spatial price differences into factors such as transportation costs, transportation bottlenecks, and the oligopolistic behavior of the arbitrageurs. Our framework incorporates a test for the presence of market power and it is thus able to distinguish between the physical and behavioral constraints to marginal cost pricing. We use the case of the "Interconnector" pipeline as an application, linking Belgium and the UK. Our empirical findings show that all the arbitrage opportunities between the two zones are being exploited but confirm the presence of market power.

SESSIONS
PLANNED FOR THE
FIRST SEMESTER OF 2015

Large Scale Development of Variable Renewables in Electricity Markets: Static and Dynamic Effects on the System

(10 February 2015 at Université Paris-Dauphine, 16:30-18:30, Amphithéâtre 6) with the presentations of Marco Cometto (Senior Analyst, OECD-AEN) on *System costs of large scale development of variable renewables generation: building an assessment methodology*, and Jonas Egerer (Research fellow at the DIW (Berlin)) on *Power System Transformation toward Renewables: the Modelling of Investment Scenarios for Germany.*

The Economy of « Demand Response »

(in preparation)

Oil Price Fluctuations and their Macroscopic Effects

(in preparation)

Energy and Economic Growth

(in preparation)

PART 7

OTHER NEWS

Seminar hosted by
Jan Horst Keppler on

"Challenges for European Electricity Markets and the Need for a New European Target Model"

4 February 2014, EWI, Köln.

Seasonal Energy Generation Challenge 6: Between Utopia and Reality: What Future for the European Energy Mix?

12 February 2014. Best prize awarded to Sébastien Phan (former CEEM research assistant) and Frédéric Haas for their work on the importance of interconnections between European electricity networks in the absence of efficient storage technologies. They were students from the Energy, Finance, and Carbon Master program, co-directed by Jan Horst Keppler and Sophie Meritet.

WEC Europe Forum on European Energy Policy to Support Transition Climate and Energy

Paris, 24-25 April 2014
CEEM Scientific Advisor Dominique Finon spoke on the subject *"Could State Aid Regulation Hinder Policies of Decarbonisation and Security of Supply?"*

Speech by
Jan Horst Keppler at

AFDEN Meetings

Energiewende en Allemagne: Contours, Implications, Perspectives, Commission de Régulation de l'Énergie, 3 June 2014

Speech by
Jan Horst Keppler at

EPEX SPOT workshop for journalists

Integrating European Electricity Markets: Challenges and Solutions, 3 September 2014, Berlin

Speech by
Jan Horst Keppler at

Climate Change and New Challenges: seminar series

organized by Passage-ADAPes, 19 September 2014, Hungarian Institute of Paris

PART 8

UPCOMING EVENTS

In 2015 the CEEM will continue organizing scientific events for academic and industrial experts.

Conference : Pricing Trends and Sending Accurate Economic Signals
28 January 2015, Université Paris-Dauphine, Raymond Aron Room, 16h00-19h00, Organized by the Association of Energy Economists (AEE), CGEMP, and the CEEM.

Continuation of the Research in Energy Economy seminar series at Paris-Sciences-Lettres.

National Energy Policies with Respect to Capacity Remuneration Mechanisms (CRM) in the Context of the European Targets
Joint Conference organized by the BENELUX and the French Association des Économistes de l'Énergie (AEE) in cooperation with the Chaire European Electricity Markets, 9 March 2015, Université Paris-Dauphine, Raymond Aron Room, 14:00-19:00.

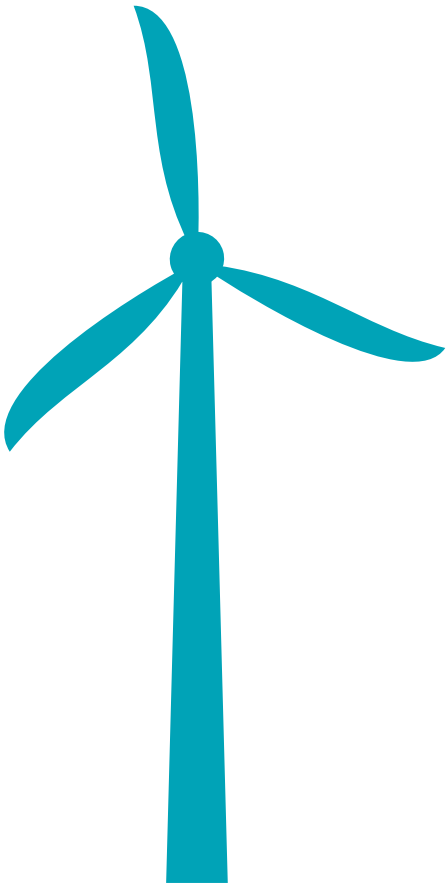
Seminar on Lessons to the European Power Sector from the USA
26 March 2015, Université Paris-Dauphine, Room A 709 (Nouvelle Aile, 7th floor), 17:00-19:30

International Colloquium: The Local Dimension of the Energy Transition
This seminar will mainly concern the role of distribution networks, 9 April 2015, Amiens.

Conference: Electricity Networks in France and Germany
17:00-19:30, Université Paris-Dauphine, Raymond Aron room.

Seminar : The Impact of Renewables on Zone Prices in Italy and Denmark
1 June 2015, 17:00-19:30, Université Paris-Dauphine, Room A 709.

International Scientific Conference: Target Model 2.0 for European Electricity Markets
8-9 July 2015, Université Paris-Dauphine, Raymond Aron room.



PART 9

DOCTORAL THESES RESEARCH

1. Analyzing the optimal development of electricity storage with increasing RES-E shares

Manuel Villavicencio's thesis subject is entitled "Analyzing the optimal development of electricity storage with increasing RES-E shares" under the direction of Jan Horst Keppler. The second year of Manuel's work is centered on the improvement and finalization of an optimization model taking into account ramping constraints.

2. The modeling of electricity production investment choices in unoptimized electricity markets

Marie Petitet is an RTE sponsored CIFRE doctoral student. Her thesis is on the modeling of electricity production investment choices in unoptimized electricity markets under the direction of Dominique Finon and Jan Horst Keppler. A dynamic investment simulation tool was developed, and it can model the development of production facilities over several decades. A study was conducted with this tool on the profitability of wind energy with fixed carbon prices and without support mechanisms. This study resulted in an article, "In a world without support schemes: investments in wind power by the energy-only market" which was presented at the 14th AEE European Conference (28-31 October 2014, Rome). This study was accepted by the CEEM Publication Review Board as part of the research stimulus program as a Working Paper co-authored by Dominique Finon and Tanguy Janssen (RTE). Currently, the simulation tool is being further developed to model "French-style" capacity mechanisms.

3. Evaluation of the technical potential of load management on electricity markets

Antoine Verrier is a GDF-Suez sponsored CIFRE doctoral student under the direction of Jan Horst Keppler. His thesis subject is "Evaluation of the technical potential of load management on electricity markets". The research is intended to model the integration of load management in electricity systems in order to evaluate the potential for technical and economic development. The methodology consists of a quantitative analysis based on a perfect free-market equilibrium optimization model. Antoine Verrier spends most of his time at GDF-Suez where he works with Dr. Andreas Ehrenmann. Work meetings between GDF-Suez and the CEEM are held regularly on this research.

4. Photovoltaic solar development policies and their impact on the dynamics of technologies and markets

Julie Hyun Jin Yu's thesis is entitled "Photovoltaic solar development policies and their impact on the dynamics of technologies and markets", and is co-directed by Patrice Geoffron and Nathalie Popiolek (CEA Saclay, Institute of Techno-Economics of Energy Systems (I-TESE)). She presented an article entitled "A Comparative Study on the Consequences and Impact of Public Policies in Favor of Solar Photovoltaic (PV) Development" at the 19th International Energy Policy and Programme Evaluation Conference (IEPPEC), which was held in Berlin from 8-11 September 2014. An article entitled "Solar photovoltaic (PV) energy policy and globalization: a multi-perspective approach with case studies of China, Germany, and Japan" co-authored by Julie Hyun Jin Yu, Nathalie Popiolek, and Patrice Geoffron will be published in a special edition of the review "Progress in Photovoltaics". Julie Hyun Jin Yu is also interested in publishing these articles as CEEM Working Papers.

5. Interactions in the wholesale electricity market: day-ahead, intra-day, and fixed-term contracts

Yuanjing Li recently joined the CEEM as a doctoral student working under the direction of Anna Creti. Her thesis subject is "Interactions in the wholesale electricity market: day-ahead, intra-day, and fixed-term contracts". Her current work is centered on

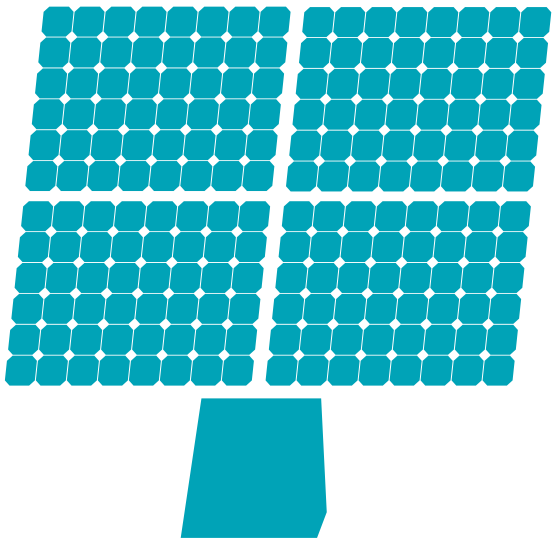
the theme "Quantifying the impact of wind power generation in day-ahead market: The case of Denmark"- "How intermittent generation influences intraday electricity prices: An empirical investigation in Danish intraday market. Yuanjing Li is part of CEEM Research Axis 1, directed by Anna Creti (Pricing in European Electricity Markets).

6. Development of electricity industry economic models in the context of smart grids

Morwenna Guichoux will defend her thesis in January 2015. Her thesis, directed by Patrice Geoffron, is entitled "Development of electricity industry economic models in the context of smart grids".

7. Market power in European electricity markets: Measures, Examples, and Solutions

Thao Pham recently had a pre-defense review of his thesis, directed by Sophie Meritet and entitled "Market power in European electricity markets: Measures, Examples, and Solutions".



PART 10

RESEARCH SUPPORT

The CEEM has hired a research assistant from the Energy, Finance, and Carbon Master's program of the Université Paris-Dauphine, Alexandre Coquentin (a civil service student intern from École Normale Supérieure de Cachan). This position is a CDD contract running from 1 November 2014 to 31 March 2015. The goal is to conduct a new research project on the cost-benefit analysis of the optimal number of electrical interconnections between the major European electricity markets.

The goal of this research, led by Jan Horst Keppler, Dominique Finon, and Alexandre Coquentin is to establish a robust methodology for calculating cost-benefit ratio of the optimal number of interconnections between European electricity markets. Three main issues are considered: consumer satisfaction, security of supply, and flexibility of supply. The method should be general and applicable to any country or technology. Another goal of this work is to determine possible trade-offs and their impact in terms of increasing or decreasing the number of interconnections.

Until January, the bulk of the work consisted of a bibliographic study of the subject as defined by Jan Horst Keppler and Dominique Finon on 18 November 2014.

A set of publications was chosen as the definitive basis for model development, and Alexandre Coquentin has begun writing a literature review in order to contextualize the Working Paper with prior work in the field (particularly within the last decade). He will also take into account European Union energy and environment policy directives. These are described in the "2020 Climate and Energy Package", and include objective goals such as greenhouse gas reduction, increasing renewable energy in the European market, and increasing energy efficiency.

For more information on the CEEM

Website

http://www.ceem-dauphine.org

The website delivers news and helps coordinate CEEM activities and research projects. Members only access includes research projects and CEEM internal seminar presentations. Several Working Papers are available through our CEEM portal at: http://www.ceem-dauphine.org/working/. All seminar presentations are published online and can be downloaded.

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