Energy and Value Letter

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- A short note from the CEVI board by André Dorsman
- Recalling the 3rd Multinational Energy and Value Issues Conference at the University of Groningen, 7-10 July 2011
- EVL's editor-in-chief John Simpson celebrates the launch of the first CEVI book with Springer Verlag
- Dutch energy market expert Teus van Eck conveys a global message: a new balance for the energy sector is still far away

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Energy and Value Letter

Editorial Board

Editorial Policy

The Energy and Value Letter brings together academics and practitioners worldwide to discuss timely valuation issues in the energy sector. It publishes news from the Centre for Energy and Value Issues (CEVI), its linked organizations and others (including calls for papers), practitioners' papers: short articles from institutions, firms, consultants, etcetera, as well as peer-reviewed academic papers: short articles on theoretical, qualitative or modeling issues, empirical results and the like. Specific topics will refer to energy finance in a broad sense. All of the papers are peer reviewed. The journal welcomes unsolicited contributions. Please e-mail to **energyandvalue@gmail.com**, c/o Özgür Arslan, a copy of a news item or a completed paper. Include the affiliation, address, phone, and e-mail of each author together with appropriate JEL classifications with your contribution. A news item should not have more than 400 words and a paper should not exceed 3.000 words.

CEVI Centre for Energy and Value Issues

Energy and Value Letter

A SHORT NOTE FROM THE CEVI BOARD

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The CEVI conference in Groningen was a milestone for our society. During this third CEVI conference the first copy of the book Financial Aspects in Energy was presented. CEVI is grateful to the publisher Springer Verlag for their cooperation, resulting in a good product. John Simpson, the editor-in-chief of this e-letter, will give in this e-letter a short overview of the chapters of this book. Feeling this success we proceed at full speed with the deadline for submission for the second book, Macro Economics and Financial Markets, set at October 1 2011. The publication of this book is expected in 2012. The editors have already received three chapters two months before the deadline.

Mehmet Karan will organize the fourth CEVI Energy School in Turkey in October 2011. In the spring of 2012, CEVI organizes the fifth Energy School in The Netherlands. The concept of the Energy School, in its wide array of presences, seems to be viable.

John Simpson visited in July University of Groningen (Wim Westerman), in September VU University Amsterdam (André Dorsman) and in October Hacettepe University (Mehmet Karan). During these visits many CEVI points were discussed, the ties between the CEVI board members became stronger and many contacts with CEVI supporters were enjoyed.

CEVI wants to narrow the gap between scientists and practitioners in the energy area. After developing some activities in the scientific and educational areas, CEVI is grateful to GEN Holding for, especially, its support of the consultancy meeting in Ankara in May 2011.

After the conference in Groningen we will cross the ocean and go to the USA, to have our fourth CEVI conference in Chicago in 2013. Our host in Chicago will be Paul Prabhaker. Paul is associate dean of the NIU (Northern Illinois University) College of Business. In this EVL, Paul will give us a short overview about the coming conference.

Step by step, our organization is growing in number of participants and in activities. As president of CEVI, I welcome your participation in the growth of CEVI.

Energy and Value Letter

3rd Multinational Energy and Value Conference

Whereas it was already the second time that the Faculty of Economics and Business of the University of Groningen took the lead in the organization of the Multinational Energy and Value Issues conference, it was actually the first time that the conference was held in Groningen, the "capital" of the Dutch "Energy Valley", on July 7-10, 2001.

The city of Groningen is well-known for being a Hanze trading society member, which is still reflected in some canals, squares, churches and houses. The city thus has a long-standing link with other Dutch trading cities, scattered over the like-wise named province and way beyond, but it has also always found itself linked with Germany and Scandinavia.

It is thus not a coincidence that Groningen houses *the* gas trading company of The Netherlands, GasTerra, but this has of course also got to do with one of the Groningen specifics: the province had the largest gas field of the world at the time it was discovered (1959). If one travels around in the province, one cannot avoid the gas flames in the plain fields.

But there is more. Groningen is also the province that is currently being reshaped as *the* powerhouse of the Netherlands and beyond. While one may question the desirability of this, it is a thrilling fact and it enables its former rather empty Eemshaven harbour to grow out of its original borders, thereby enabling The Netherlands to become a net power exporter.

Yet, the big thing about the conference was not the location of the session's venue, but it was rather the sessions themselves. There was a nice group of paper presenters, a fine keynote speaker (Bert Scholtens) and diverse practitioner presentations. And last but not least: the first CEVI book was presented on behalf of the Springer editor herself (Barbara Fess). Notwithstanding the above, special thanks go to the people who are mentioned below.

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Paul Prabhaker - Northern Illinois University, USA
Bert Scholtens - University of Groningen, The Netherlands

Energy and Value Letter

CEVI Books: The First of Many

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The first CEVI book, edited by André Dorsman, Wim Westerman, Mehmet Baha Karan and Özgür Arslan and published by Springer is now in print. Its title is "Financial Aspects in Energy" and it takes a European perspective. The book was purpose planned to include parts that relate to energy sector markets, prices, regulations and firms. Chapters were carefully selected to include coverage, examination and analysis of important issues in each of these broad areas.

In Part one, Markets, Onno Kuik and Sabine Fuss provide a sound analysis of renewables in the energy market with a financial and technological examination that also considers risk and policy options. George Daskalakis, Gbenga Ibikunle and Ivan Diaz-Rainey provide a financial perspective to the carbon dioxide trading market in Europe. Another chapter in part 1 looks at the development of energy markets in Europe (Mehmet Baha Karan and Hasan Kazdağlli).

In part two, covering energy prices, Don Bredin and Cal Muckley describe and analyse the price forming process in energy markets. Another chapter in part two investigates market perfection in a changing energy market (Andre Dorsman, Kees van Montfort and Paul Pottuijt) and also a chapter in part two provides an expose of the day ahead market and the futures market in electricity several European countries (Göknur Umutlu, André Dorsman and Erdinc Telatar).

In part three, regulations, Jennifer Westaway and John Simpson discuss the disintegration of the concept of sovereignty with respect to the European energy sector. Johann-Christian Pielow and Britta Janina Lewendel provide an analysis and coverage of the European Union energy policy post Lisbon Treaty and Simone Pront-van Bommel discusses the development of the European electricity market in a juridical context.

Part four deals with issues relating to energy firms with a chapter that covers value creation from wood based energy sources (Satu Pätäri and Wim Westerman) and another that deals with natural monopoly in electricity and natural gas industries (Özgür Arslan and Hasan Kazdağli).

It is expected that the most productive trend of researcher collaboration will continue in subsequent CEVI publications and, as mentioned in the chairman's note, the next book, it is expected, will appear on the shelves before the next CEVI conference in 2013.

[1] John Simpson is the editor-in-chief of the Energy and Value Letter.

CEVI
Centre for Energy and Value Issues

Energy and Value Letter

A new balance for the energy sector is still far away

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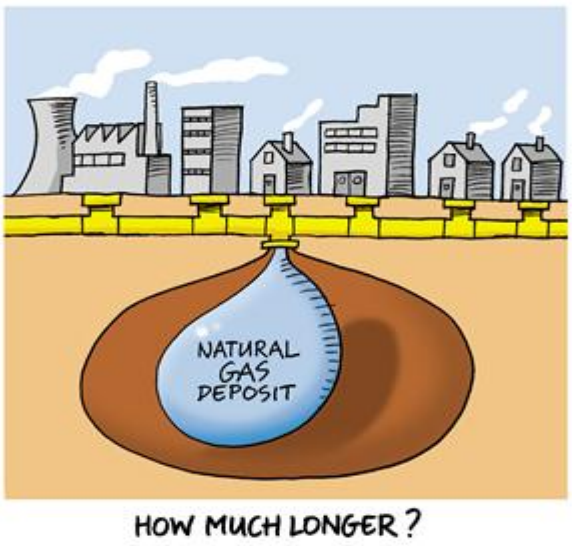
Abstract

The introduction of the liberalized energy market was based on the idea that it was positive for welfare and wellness. After 10 years of experience we see in The Netherlands only 4% renewables in the energy supply, policy makers give priority to electricity while heat and transport remains the biggest part of the market, energy saving programmes are not really effective, the amount of fossil fuels and CO_2 emission is still growing and local initiatives for optimizing the local energy chain have no priority. The Dutch gas fields will be empty within 15-20 years with dramatic consequences for the country's government budget, the trading balance and the dependency from far distance import. A wake-up call for changing the mentality and behaviour of the consumers is necessary, all around the globe. Politicians and manufacturers influence the consumers but in the end they tend to follow them.



[2] The author is an energy consultant, living in Oosterbeek, The Netherlands. He is the author of two books.

1. Introduction

In 2007, I published my book “A new balance for the energy sector, no longer a puppet in the hands of technology, public interests and markets”. After 4 years, the title is still very up-to-date, but also still far from the actual reality. In this article, I will give an overview of today’s situation and the problems and challenges for energy savings and sustainability.

The main items are the actual energy supply situation, the notion that energy is more than electricity, the available production options, the position of the energy grids, the importance of decoupling of supply and demand as well as energy storage, energy saving, the local/small scale versus large scale/international issue and smart grids, energy chain dependency, energy chain sustainability analysis, and the position of the consumer. The article is mainly based on the case of The Netherlands, which is well comparable with many other countries however.

2. The actual energy supply situation

In policy notes and conferences everybody is talking about energy saving and sustainability. In reality the energy saving level is much lower than the EU rules set for 2020 and the share of renewables is only 4% of the total energy consumption. The total consumption of fossil fuels is still growing. The investments in traditional fossil fuel power plants and high (international) voltage grids have never been higher then nowadays. Yet, government policy makers still believe that the market will create a level playing field for energy savings and sustainability. Even new nuclear power stations are part of the Dutch government policy.

The big international energy companies prefer to build brand new traditional power stations in the Netherlands because there is good legislation for grid entrance, very good logistics for coal, natural gas, electricity, biomass as well as plenty of sea cooling water. In general, they are not interested in cogeneration because cogeneration reduces the flexibility in the electricity market. They are only interested in sustainable production with 100% government guarantees. The costs for extensions of the high voltage grids and the operational problems of the electricity system are mainly paid by the consumers. The Dutch government believes still very strong in the CO2 Emission Trading System (ETS) but the CO2 prices stay low, a big part of the market has no ETS obligations and the future of the system is still unclear.

On the other hand, the number of local Dutch initiatives for energy savings and sustainability is higher than ever before. The problems with those initiatives are the return on investment in the short term, no long term government policy, lack of professional knowledge and experience, financing, not in my backyard movements, etcetera.

3. Energy is more than electricity

In the national and international energy discussions, priority is given to electricity. Sometimes this gives the impression that energy equals electricity. Yet, it is clear that the biggest part of energy consumption is heat for process steam and hot water for heating and cleaning. To realize the objectives for energy saving and sustainability, it is necessary to spend much more attention to heat and transport. In (sub-) tropical countries there is, instead of heating, a high demand for cooling. The problems and possibilities are nearly the same. There are many options for energy savings and, for the unavoidable part of energy consumption, a reasonable share of renewables.

4. The available production options

The traditional options for electricity production are large scale power stations with coal and natural gas. In the horticultural sector, gas engines with cogeneration are popular and in the industrial sector smaller scale STAG's (Steam and gas) with cogeneration are in operation. Market shares are around 25% for coal, 55% for natural gas and 10% for renewables. The remaining part is nuclear energy, waste incinerators and imports. The Dutch import share has been 15 – 20% for a long period, but it is only 2% now and in the coming years The Netherlands will become a net exporter of electricity. The cogeneration part is formally around 35% in capacity, but in production it is actually much lower. The fuel efficiency without cogeneration for new coal fired power stations is around 45% without CCS (Carbon Capture Storage), for gas fired STAG's around 60% and for gas engines around 45%. The operational average fuel efficiency is much lower. This is due to a great number of older power stations and the necessity for start-stop and low capacity operations. A number of coal fired power station are under construction and there are plans for a new nuclear power station, but the resistance against those options grows. Therefore the future seems to be for natural gas and renewables.
As to heating, the main options are cogeneration and natural gas boilers. They have a market share of more than 90% and their source is mainly natural gas.

5. The position of the grids

The energy grids connect the supply and the demand of energy. In today's liberalized energy markets, the gas and electricity grids are still in the regulated domain. The grid operators have the obligation to prevent constrains for trading opportunities in the whole European market. The formal European policy is to stimulate the construction of evermore high voltage grids between the different countries and markets. The buzz words are: large scale, international, electricity. On the other side, it becomes more and more clear that smart grids that optimize the local total energy situation (electricity, heat, cooling and transport) are very important for a sustainable future. Without local options, also the dependency of import and big long distance vulnerable infrastructure becomes dramatic.

LOCAL OR INTERNATIONAL?
(CUSTOMIZED SOLUTIONS)

The large scale transport of electricity over long distances is only effective on the long term in the event of regional surpluses of renewable power and/or structural variations in demand patterns. To create a long term effective sustainable policy, we need local, national and international coordinators with formal power to optimize the total system. That seems to be a natural role for the local and the international Transmission System Operators (TSO's), but it needs a total change of mind. The society should have sustainability as first priority. Only a sustainable society mentality can create the political courage and flexible TSO's for implementation. In such a society, the key phrase will be "optimization of the total energy system to create a sustainable society" instead of "free market, large scale, international, electricity".

6. The importance of decoupling supply and demand + energy storage

One of the biggest problems to create a sustainable energy supply is the availability of the supply versus the development of the demand. The demand for electricity is quite stable all over the year, but the demand in the peak hours is around twice the demand of the off-peak hours. Storage of electricity is possible, but it is difficult and expensive for large quantities. Examples of electricity storage are batteries and pump accumulation with pressed air or water. The process heat curve is in general constant all over the year. The demand curve for heating and cooling has a strong temperature dependency. The transport energy demand curve is very different for every separate means of transport.

On the supply side, the fossil fuel options are on average reasonably flexible. The owners of traditional power plants prefer stable operation for technical and fuel contract reasons, but an output variation from 25 – 100% is in general possible. Daily start-stop operation is possible, but not favoured with coal fired and nuclear power plants. The STAG's are very flexible and can change their output capacity fast. The consequences of changing the output and start stop operations are higher maintenance and fuel costs. Cogeneration makes the power plants less flexible. Industrial process steam needs constant operation. Steam storage is technically not possible. Heat water has a very different demand curve, which is not in balance with electricity demand. Heat storage over the night or over the weekend is possible, but it costs money. Seasonable storage of heat is in study and it looks very attractive. Boiler operation instead of cogeneration is possible, but daily volatility is risky and, from a sustainability viewpoint, even dramatic. Storage of cooling is compatible with heat. The first priority for waste incinerators is burning waste, with inflexible base load operation for electricity and/or heat. There is a big difference in flexibility between the renewable options. Biomass is compatible with traditional power stations. Hydro-power with storage lakes is optimally flexible, but hardly

available in The Netherlands. Flowing water is not flexible and it is only available on a small scale. Wind and sun power are completely dependent on the availability of wind and sun.

On the demand side, there are many demand management possibilities, but in the actual market system it is hardly an issue and technically difficult to manage. With the grids it is not only the needed capacity, but also the stability of the total grid that matters.

For a sustainable society, it is a necessity to decouple supply and demand of energy including storage facilities. The actual problem is that TSO's are only responsible for the daily balancing of the electricity system. For the long term nobody is responsible and also nobody takes care of balancing the total local energy supply and demand. That is no longer acceptable.

7. Energy savings

Saving energy is the most sustainable option and in many cases easier and cheaper than renewables. In all of the sectors, plenty opportunities occur, but the biggest problems are our mentality, lack of knowledge and experience and of course the short-term costs.

On the supply side, the main issues are higher fuel efficiencies, optimization of operations with regard to environmental aspects and the use of waste heat. Higher fuel efficiencies have a technical limit, but there are still possibilities. The fuel efficiency of gas fired power plants has gone up from around 30% in the early fifties to around 60% as of today. Coal fired power station efficiency has risen from 25% to 45%. With the actual knowledge it can probably become at most 5% higher in the future. Biomass has a fuel efficiency of around 40%, but it gets more and more attention. The issue is what is the best option for the future, co-firing in coal fired power stations, burning in boilers, gasification or fermentation? Optimization as to environmental aspects will only be done when it provides financial profits in the operation.

The first step is the ETS, but in practice this does not really work efficiently. Rather, more attention to good house holding for the installations, processes and apparatus is important for all parts of the energy chain. The use of waste heat has the highest potential for energy savings on the supply and the industrial side. The Netherlands has one of the highest shares of cogeneration in the world, but we still don't use the equivalent of more than 15 billion m^3 natural gas (35% of total natural gas consumption) effectively. We use that amount of energy for heating the rivers, the sea and the air. The EU is working on a Directive stating that permits for power stations will only be given when a useful option for the waste heat is foreseen. There is a strong lobby against that proposal from the big traditional market players.

Energy savings in the Dutch energy grids have in general a low potential. The average losses in the electricity grids are around 4%, which is probably the lowest level in the world. However, in the optimization of the total system it stays a point of attention, as well as for the transport of fuels, the biomass chain and the local transport and distribution of heat.

In the industrial sectors, there are a lot of possibilities for process optimization and using waste heat. The problem is often the required very short payback times in the multinational firms and that the core business has always the priority. One of the biggest opportunities is cooperation with neighbouring firms. Surplus and deficits of energy exchanges, using the waste of a company as a raw material for another company and other possibilities may occur. The problem may be though, that a seller of the surplus wants to deliver without guarantees,

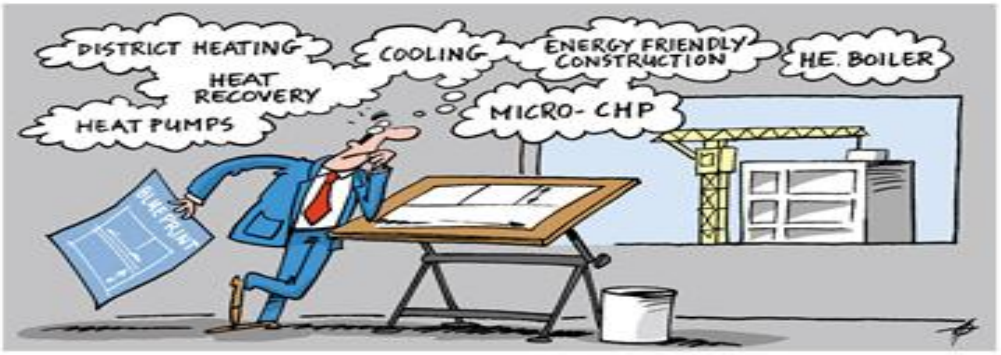
whereas a buyer wants guarantees for a long time. To solve this problem, (public?) companies can take over some risks and connect physically and contractually the different parties.

The horticultural sector is an example that energy saving and sustainability can be very successful if it is necessary to survive in the market. Energy is a very important part of total costs and the Dutch sector has to compete with (sub) tropical countries. The actual issues are seasonal storages of heat, energy producing greenhouses, heat/cooling storage, geothermal heat, the use of LEDS to stimulate growth with low energy consumption and the exchange of energy with neighbouring consumers/producers. The sector does not just work on direct savings, but also for optimization of the total chain.

In the utility building sector is the integral concept, heat/cooling storage, the use of natural cooling and Led lighting very successful. The share of good projects in the total market is still low but growing. There is not enough attention for integral construction teams, quality control and guarantees for the exploitation period.

For houses, there are a lot of options. The main items are insulation, ventilation with heat recovery, "metering is knowledge", simple and effective "thermostat", low temperature systems for heating, preventing the necessity for cooling, savings on heat water consumption, efficient lightning, hot fill washers, heat pump dryers, Label A+++ apparatus, good instruction to consumers and the mentality of the consumers, all of this in combination with efficient energy systems. In range of energy saving/sustainability potential from bad to good, the market offers high efficiency gas boilers, micro CHPs (Combined Heat and Power), different types of heat pumps, heat distribution with waste heat, geothermal heat and/or sun heat. Separate decisions refer to sun photovoltaic (PV), sun heat boilers and small wind mills. Sun PV and windmills are in general more effective in cooperation with a larger scale project. Quality guarantee is also a big problem with houses. There are many options, but in practice the existing regulation is not effective and for many consumers it is not a priority.

Energy saving must have priority, because saved energy is 100 % sustainable and lower energy demand makes it easier to create energy storage facilities and to create flexibility in the total system.



8. Small scale/local versus large scale/international and smart grids

Smart grids seem to be the magic formula for energy savings and sustainability. In reality there is not a standard definition for smart grids and many people have in reality no idea how they may work. The intention should be: "how can we optimize the total energy chain on base of clear objectives and definitions?" In this way, we create a way of thinking to solve the problems as described in this article.

9. Chain dependencies

Before the liberalization of the energy markets, the mainly public utilities were responsible for the total system. Now the markets have many players with their own responsibilities and interests. In practice, the markets are very strongly driven by short term financial profits and power. Nobody is responsible for the public interests concerning environment/sustainability and for optimizing the total energy system. Because all market players are connected with and/or work for the same physical system, the actions of every separate player have consequences for the total system; there is chain dependency. The idea was that very strong and flexible grids should solve all the problems. In practice this means that all of the operational problems of the system and very high investments in the grids become a problem for the grid operators and that the costs are for the consumers. Still, a big part of the energy system is local. Can the markets solve this problem by using financial incentives for all in the public interest or do we need powerful coordinators with obligations and much more attention for local possibilities and problems?

In my opinion, the production part of the market can stay liberalized, but for the total system we need powerful coordinators and Public Private Corporation (PPC) constructions.

10. Chain sustainability analysis

The effectiveness of (renewable) fuels and supply and demand options is often determined on the base of a part of the total chain. That can give the wrong signals to the society. For instance, electric cars can be beneficial, but that depends very strong on the electric source. When we use electricity produced by a coal fired power station, the sustainable effect is low. With locally produced electricity by PV the sustainable effect is high. Also, if we burn waste wood for only electricity production with 55% waste heat and that wood can also be recycled, the sustainable effect is negative.

There are much more examples. The message is: stay critical.

11. The consumer

The mentality and behaviour of the consumer is the key to success or failure. All the produced products and energy are a consequence of our lifestyle. Politicians preferably take sustainable decisions when it results in extra votes in elections. Companies produce sustainable unfriendly products when there is a market. Actually, the big majority of the consumers seem to be more interested in nice kitchens, bathrooms, cars and the consequences of the financial crises instead of in a sustainable society. Do we need a disaster to change or do we get an insight that a sustainable society creates a lot new opportunities and a future for our children?