

Research at Columbia University in
the City of New York
-The land of opportunity-

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The 2007/2008 academic year in New York City, at Columbia University, as a Fulbright Visiting Scholar was my best year so far. In September –two weeks after my wedding in Budapest– I landed in the city of yellow cabs and skyscrapers. From the humid summer outside I walked into the Earth and Environmental Engineering department’s cool offices where I sat in a room of ten. In November I visited a Professor –who later became the foreign adviser of my PhD– at MIT in Boston. With his guidance I became part of an international research team focusing on the ex-post evaluation of the EU carbon market. In January 2008 I took part in my Fulbright adviser’s corporate sustainability study, then I moved to my own office. This year entirely changed my life, thank you Fulbright Commission!

1. Introduction

Currently I am working for Climate Strategies in Cambridge, UK, which would not have been possible without my Fulbright scholarship in the US. I am Research Manager in this international network of leading academic experts offering rigorous and independent research on climate change policy and economic issues. This position requires a PhD, which I have recently finished in Environmental Economics. The underlying research was made possible by my participation to the research group Association for Promoting Research on Carbon Economy (APREC) that I joined during my Fulbright stay, through MIT Center for Energy and Environmental Policy Research.

Having been a Fulbright scholar was not only a great academic adventure but also a cultural and social challenge. In the next few pages let me briefly let the reader know my personal impressions of the US, especially of the city of New York, followed by my academic results and experiences.

Overall, my stay as a Fulbrighter in the US was a fantastic experience for which I shall ever be grateful!

2. Non-Academic Adventures

If one told me the Fulbright scholarship has changed his life I would not be surprised. It has certainly changed mine!

Let me briefly mention a few things I have noticed in New York City, which is of course not representative of the whole country.

- The use of email is far more frequent than mobile phones - this may be explained by the bad reception?!

- Everyone works a lot (way more than what I was used to) and likes to be busy. The best response to “How are you doing?” is “Fantastic” or “Busy”.

- Communication is different – one needs to get used to it. For example “let’s have a drink” does not mean someone would meet up with you “let’s have lunch soon” or “I’ll call you” just does not mean what they say. Once one understands the style, it’s OK.

I liked:

- that the US is truly the country of opportunities (if the reader continues to read section 3 will see what I mean), nothing is out of the question
- there is no smoke in buildings, restaurants, pubs
- people are so diverse
- universities are so different, indeed an intellectual hub with lively debates
- online shopping (freshdirect.com)
- everyone is PC (politically correct)
- does not matter where one came from, Hungarian may be viewed as “exotic”

I did not like:

- the subway – although it’s a great system it is puzzlingly ugly, dirty, even full of rats
- excessive air conditioning – it was freezing inside every building during summer
- ice cubes – each and every drink is 2/3 ice ,1/3 liquid
- people are not attentive
- “I am Hungarian” – “Are you hungry?” haha...or even worse “Why don’t you go to Turkey then?”

2. 1. New York – the city that never sleeps

New York City is really like as in the movies! Yellow cabs, fire escapes, university campus, paper cups, numbered streets and Avenues. Everyone is in a constant rush, one needs to stand in queue even to cross the street on a green light!

Besides the two sports events I visited – a NY Yankees - Red Sox baseball match and a basketball game in the Madison Square Garden – I enjoyed many cultural events. Amateur Night at the Apollo Theater (www.apollotheater.org), Blue Man Show where by arriving early and assisting with the seating of the audience one can watch the performance for free (http://www.bluelman.com/tickets/new_york), a stand up comedy, and concerts in the Carnegie Hall.



2. 1. 1. Columbia University in the city of New York

Columbia University –especially compared to my host institution– is a great intellectual forum, hosts many interactive seminars, talks, lunch debates, offers a wide range of courses and has an amazing campus with a multi-storey sport centre. It was a fantastic experience to be part of it!

Professors respond to emails within two days, during visiting hours their doors are open to everyone. Libraries are amazingly rich, if one cannot find a book, the librarian would order it to arrive within 2 days. One may borrow as many books as one may want for an entire semester.

One week into my stay, Ahmadinejad, the President of Iran gave a much debated and critiqued speech at Columbia University; I was there in the crowd too.

Being a student (Unlike in Hungary where student is a *“ballgató”*, which means literally *listener*) means to have an opinion, to ask questions, to actively participate in a course. Students need to prepare from week to week, do homework, read assignments, and everyone does all with enthusiasm.

Furthermore what seized me was the career center where students receive professional help with drafting their CVs and job applications.

2. 2. Programs

For Fulbrighters there were a wide range of programs organised both by Metro International (now called One To World, <http://www.one-to-world.org>) and the Institute of International Education (<http://www.iie.org>), I would recommend to sign up to their newsletters prior to arriving in the US. At Columbia University the International Students and Scholars Office (ISSO, <http://www.columbia.edu/cu/isso>) was not only very helpful but also organised diverse and fun events (eg. the International Spouse and Partner Network made international students’ partners lives easier).

Besides the programs in New York City I was lucky to be selected for the Fulbright **Enrichment Seminar** in San Antonio in March 2008. The topic “Engaging the Electorate: The Dynamics of Politics and Participation in 2008” was timely and relevant because of the US election. A “mock election” was organised for us, where Parties – Democrats, Republicans and Independents – as well as the public and the press were represented by a group of Fulbrighters. The parties had to prepare their programmes and speeches, followed by a debate between the Candidates. The day ended with voting, and Independents won! It was not only a superb cultural learning experience but also great fun.

3. Academic Adventures

3. 1. Visiting Scholar at Columbia University, The Earth Institute

I have started a Ph.D. in Environmental Economics at Corvinus University of Budapest in 2005 focusing on carbon markets. By the Fulbright scholarship in 2007 I had already finished my courses so my title was “Visiting Scholar” meaning I had to focus solely on reviewing literature, outlining my research questions and hypothesis, and conducting the analysis itself.

3. 1. 1. Earth and Environmental Engineering

Having arrived to the Lenfest Center for Sustainable Energy I became part of a group of environmental engineer PhD students. We had weekly meetings where one or two students presented on their research and emerging results. To be honest, this was one of the most challenging parts of my Fulbright stay – to understand engineering lab results. It was fascinating how all I have ever learned about was to do with the economics of the same topic, eg. costs of mitigating climate change effects. These students worked on the specific mitigation actions, eg. on how to capture and store CO₂ under the ocean!

Besides conducting my own PhD research, as I was not enrolled in a program I could still audit courses: I chose one on nuclear energy and one on academic writing and research design. The first course because I was interested in the topic and I had the privilege of listening to two experts in the field twice a week. The latter because it was utterly useful for my studies. I also assisted the department organizing interdisciplinary Carbon Colloquiums on carbon regulation and energy policy issues; this was a monthly evening meeting with a presentation, followed by a discussion and a reception.

3. 1. 2. Carbon Footprinting analysis

The Lenfest Center contracted with a multinational company in the FMCG industry to develop a methodology to evaluate carbon and energy sustainability options in carbon footprint and labelling assessment to emerge as industry standard. The group was looking for an economist to be part of the team, and there was I! I was lucky to be offered a job opportunity by my advisor at the department. Unfortunately the IIE did not make international students’ lives easy so I could not accept the job but we agreed I would still work for the project without getting paid. My title then changed to Corporate Sustainability Research Fellow and I was offered an office – all to myself! What I first thought to be a disadvantage, namely to be amongst engineers, turned out to be my advantage at the end. I took part in identifying carbon emissions related to a broad set of life-cycle activities, in providing scope definitions, establishing a framework for carbon quantification and in analyzing carbon reductions and carbon pricing along product life-cycle emissions. I was

integral part of the team, even participated to their industry stakeholder meeting as an expert in Tampa, Florida too!

Unfortunately with my Fulbright scholarship and J1 visa terminating I could not continue to work on the project even though my advisor and the team were keen on cooperating further.

3. 2. MIT Center for Energy and Environmental Policy Research, Boston, MA

I have been reading and reading environmental economics literature in the Columbia University library and every time I came across the name of the same professor, Dr. A. Denny Ellerman. He is recognized internationally as an authority on emissions trading and energy economics. I learned that in the US the best way to communicate is via email, so I sent him an email introducing myself, my situation in the engineering department and how keen I was to get involved in any research he may be conducting in the field. To my biggest surprise he responded to my email overnight and explained that he was indeed in the first phase of a research program focusing on the ex-post evaluation of the EU Emissions Trading Scheme (my PhD research topic) and they were indeed lacking researchers from Eastern Europe. What a fantastic coincidence!

Two months into my Fulbright scholarship I paid him a visit in Boston at MIT Center for Energy and Environmental Policy Research to discuss over lunch our potential collaboration. We then agreed that I would participate to the ex-post evaluation of the European CO₂ market in the framework of the international research program, *Association for Promoting Research on Carbon Economy* (APREC, <http://www.aprec.net>). This was not a paid job so did not interfere with my Fulbright status, and in the following months I attended a conference in Washington DC, I gave a presentation on the implications for the Hungarian sectors in a workshop organised in Prague and my contributions in their working paper versions have been incorporated in and cited in the book published in early 2010 by Cambridge University Press, *Pricing Carbon: The EU's CO₂ Emissions Trading Scheme*. Prof. Ellerman was also willing to be my foreign advisor for the PhD for which I am still very grateful. Furthermore, my research would have not been possible without the data retrieval program of the international transaction log of emissions quotas. If the reader is interested in the details of the research please go on reading.

3. 3. Ph.D. Dissertation – Carbon Market Implications for new EU Member States – Empirical analysis for Hungary

Abstract

The dissertation provides a theoretically sound and empirically validated understanding of carbon trading in Hungary. The research contributes to the field of

environmental economics by analyzing data of companies directly subject to the EU Emissions Trading Scheme (EU ETS) and by drawing conclusions in order to improve the system for the post-Kyoto phase. This ex-post research is the first attempt to qualitatively and quantitatively estimate the effects of emissions trading on a new market economy based on actual market data. The study provides insights into how political, economic and climate policy contexts shape responses to the EU ETS.

Research question

This dissertation aims to present the pilot phase of the EU ETS between 2005 and 2007, and to provide an analysis of the Hungarian experiences. The prevalent international opinion is that new EU Member States will slow down or even reverse EU environmental policy, due to their “Socialist past and related economic/administrative transition challenges”. It is interesting to analyze, then, how this market-based environmental tool worked in Hungary during the pilot phase. Could it be implemented in a country that has lacked the necessary institutions, experience with markets and practices?

The doctoral dissertation:

- (1) has certified that emissions trading as a market-based environmental tool works well even in a country that has lacked necessary institutions, experience with markets and practices;
- (2) has analyzed the impacts of the EU CO₂ Emissions Trading Scheme on Hungarian companies during the pilot phase; and
- (3) has quantified Hungarian companies’ involvement in the EU CO₂ emissions allowance market.

Research Methodology: Qualitative and Quantitative Analysis

To provide an in-depth analysis the study integrates economic and environmental science approaches, and undertakes a detailed examination of the pilot phase of the EU ETS in order to record accurately for posterity what has been done, how and why. This ex-post research is the first attempt to qualitatively and quantitatively estimate the effects of emissions trading on a new market economy based on actual market data. Findings are based on the analysis of Community Independent Transaction Log (CITL) databases, and of Hungarian Registry emissions data, as well as structured interviews. The recently emerged allowance market in Hungary is investigated by interviewing installations responsible for more than two thirds of the Hungarian allocation. By connecting surrendered allowances from the CITL database to Hungarian operators the dissertation sheds light on the volume and frequency of both domestic and international allowance transfers.

Key Findings

The findings of the dissertation are structured around the following three main hypotheses.

The majority of Hungarian companies have not realized the opportunity cost of emission allowances.

During the 2005-2007 pilot phase Hungarian companies covered by the EU ETS received 97.5% of the allocation at no cost to them. In keeping with relevant economics theories, opportunity costs have to be considered even when discussing free allocation of allowances, as the profits resulting from their possible sale do not differ from cost-based allocation. In this scenario, the opportunity cost refers to the fact that for every tonne of carbon-dioxide emitted, the number of emission allowances – received in this case for free – available on the market decreases by one, so that companies' potential revenues will also decrease by the same amount. Interviews showed that – contrary to the theory – companies did not recognize the opportunity costs of these allowances during the pilot phase.

Hungarian companies tended instead to pursue a cost-minimizing strategy regarding the EU ETS, and were not striving to maximize their profits. If they had been interested in maximizing their profits, they would have reduced their emissions and increased their allowance surplus, increasing their own presence as sellers in the international carbon market. Instead, a substantial number of Hungarian companies focused on compliance and worked to reduce their own costs related to the introduction of the new system. They did not recognize that the grandfathered allowances also entail an opportunity cost as well as a profit-generating potential in the same way as they would had the company had to pay for them. Based on personal interviews, it may be concluded that the majority of Hungarian companies did not recognize that grandfathered allowances have an opportunity cost; in other words, that by reducing their emissions, further units would become available, the sale of which would generate additional profits.

It is worthwhile to differentiate between the sale of the surplus free emission allowances and the recognition of the opportunity costs. This thesis supposes that, as can also be concluded based on the interviews, Hungarian companies did not substantially reduce their emissions. This study quantifies the surplus, which was at the companies' disposal as a result of the generous allocation, as the difference between the verified emission amounts for the given year and the allowances originally allocated. Based on these calculations, Hungarian entities amassed a surplus of some 12 million tonnes. Trade data show a net amount of nine million tonnes that was transferred abroad from Hungarian trading accounts. It was not possible, however, to quantify, based on the data available, what percentage of this amount was related to internal transfers executed by international companies and what amount was actually sold.

The large number of foreign allowances surrendered by Hungarian companies is not a result of purchases, but is due to internal transfers by multinational companies.

The data of the Hungarian transaction Registry show that a significant number of emission allowances, originally allocated abroad, were transferred to Hungarian installations. This is surprising, as virtually all Hungarian sectors and installations amassed surpluses during the pilot phase. During these three years more than one and a half million emission allowances were transferred to the accounts of Hungarian installations from foreign accounts. This import activity seems questionable – why would Hungarian companies, in possession of a surplus, purchase emission allowances from abroad to ensure their compliance? Import data seemed misleading; it therefore appeared useful to also identify the allowances surrendered in Hungary but originally allocated abroad, and to examine the industries involved. This part of the research was made possible by an examination of the CITL.

The quantitative findings of the dissertation were confirmed by the personal interviews conducted. It was found that the headquarters of foreign-owned companies tended to pool their subsidiaries' units at the beginning of the compliance period, and would re-allocate at the end of the period the number of allowances each installation required to meet its obligations.

The difference between aggregate Hungarian transaction data and real trade data serves to justify the research methodology used, which combined information from the two databases. Results thus showed that the significant import activity apparently conducted by Hungarian installations was not necessarily an accurate assessment. Four-fifths of the foreign emission allowances entering Hungary were accounted for by internal transfers between the headquarters and the Hungarian subsidiaries of multinational corporations.

(1) *The Government of Hungary made use of the revenue-generating potential of emissions trading.*

According to a general perception, Eastern European EU Member States lack the necessary experience to recognize and make use of the opportunities within the emissions trading system. For Hungary, participation in the EU Emissions Trading Scheme was an obligatory component of the country's adherence to the European Union. The lenient goals aimed at the reduction of emissions led to environmental concerns being pushed to the background, and the Government of Hungary began to look upon the EU ETS more as a tool for economic development rather than as a system necessary for meeting environmental protection goals. This dissertation, however, confirms that the GOH met the inherent challenges. During the pilot phase, the establishment of the institutional framework for the implementation of the EU ETS, and compliance with relevant legal regulations, encountered some obstacles, which was exacerbated by the lack of experienced officials and the continuous fluctuation of any such individuals. The

long process of institutional learning evolved from a sort of “blind leading the deaf” scenario.

At the same time, Hungary was in many ways a pioneer among the Member States: the country was first to join the UN’s International Transaction Log, which is a major step toward the establishment of a global carbon market. Hungary was also the first in the region to establish a Green Investment Scheme to ensure that surplus allowances do not harm the environmental effectiveness of targets aiming to reduce emissions. Hungary was also the first nation to sell Assigned Amount Units to another country at a high cost. Hungary was one of only a handful of states to have used provisions in the ETS Directive allowing governments to auction allowances, contributing 10 million EUR to the central budget of the country. The Hungarian experience serves as evidence that a new market economy has the institutional capacity and technical expertise to carry out auctioning. This dissertation wishes to call attention to the stressful situation due to the conflict of interests and lack of coordination between Ministries when conducting the auctions. Accordingly, the timing of Hungarian auctions did not help maximize profits, as market prices fell in the meantime.

Implications of the Pilot Phase EU ETS on Hungarian Installations

The dissertation examines the effects of the EU ETS pilot phase on Hungarian companies in part through interviews and in part through an analysis of allocation, verified emissions and allowance transaction data. During the personal interviews, company representatives mentioned *uncertainty* as the main feature of the scheme. Short deadlines and delays in regulation, however, are not unique to the eastern part of the continent.

Hungarian companies considered the pilot phase of the European

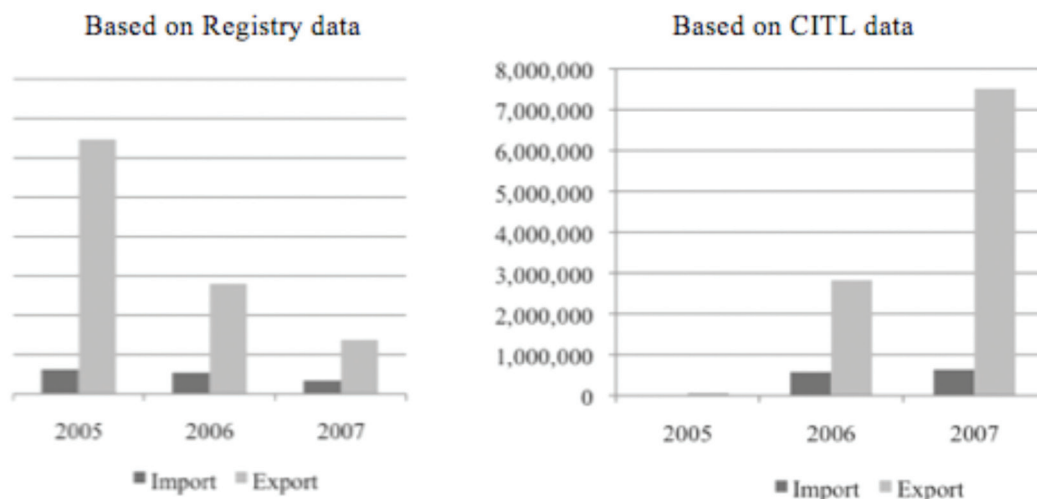
Unions Emissions Trading Scheme to be an administrative burden. They viewed the grandfathered amount as their standard emissions limit, and worked to maximize their profits through the allocation process. In other words, they were interested in obtaining as many grandfathered allowances as possible, instead of focusing on abating emissions. The companies looked upon the free allowances received as a kind of maximum emissions amount to work with. Their relevant officials never considered that it might be worthwhile to realize further reductions. The companies did not perceive the price of carbon to be expenditure. Nonetheless, the three years of the pilot phase proved sufficient for Hungarian companies covered by the scheme to realize that the emission of carbon-dioxide has, indeed, become a new factor of production, which must be taken into consideration when making business decisions.

In the case of Hungarian companies, the EU ETS pilot phase did not bring about technological or operational changes, which would otherwise not have been instituted had the system not been put in place. *The effect of the pilot phase on driving innovation was marginal*, a result both of the abundant supply of grandfathered allowances in Hungary and the low carbon prices.

Regarding competitiveness implications of the scheme on Hungarian sectors, respondents cited carbon leakage above all. Leakage refers to the relocation of carbon emitting operations to new locations outside the borders of the EU ETS. This possibility is especially relevant in the case of cement production and oil refinery, but only in the post-2008 Kyoto-period.

The questionnaire used for the survey also showed that companies covered by the scheme, in general, did not wish to begin trading with allowances, but focused rather on ensuring the sufficient amount to cover their own CO₂ emissions. *The overall impact of the EU ETS on Hungarian companies during the pilot phase was not significant.* Its effect on company operations was mostly limited to fuel switching.

Fig. 1: Trading of emission allowances



Only one of the companies approached for the survey introduced the costs of carbon-dioxide emissions into its operational and investment decision-making processes. This company applied the shadow price of CO₂ in its profit and management evaluation criteria. By setting an internal carbon price, higher than actual market prices, this company created exemplary strategic opportunities and the potential for profits.

Applying the EU emissions allowance trading necessitates a learning process within companies. Initially, participants viewed the system as a regulatory framework; it took time for that to change. The management then had to realize the new system of regulations, and had to appoint an official within the company to oversee the process and comprehensively introduce tradeable allowances in the company's operational and strategic functions. Only then could the emissions trading system become an integral component of the company's operations and processes, leading to an internalization of CO₂. Hungarian companies did not reach the final stage of this process during the pilot phase.

The research for the dissertation covered data from the three-year pilot phase. During this time, a common and liquid carbon market was established, without national borders. Traditional financial products also appeared: options, swaps, hedges and derivative deals; futures trading also commenced, in addition to spot trading (and in fact preceded the latter due to the delays surrounding registries).

Two databases are available for the analysis of the Hungarian market activity with carbon allowances: surrendered allowances recorded in the Community Independent Transaction Log and the transfer data of the Hungarian National Registry. Generally, and for the three years of the pilot phase, the information contained in the two databases matches. Emissions allowances were transferred to foreign accounts from Hungary – approximately 10.5 million EUA. At the same time, allowances were transferred to Hungarian companies from abroad. Broken down by year, the two databases contain different figures, however. According to the Hungarian registry, 1.5 million allowances originally allocated abroad showed up on Hungarian trade accounts, whereas CITL figures show 670 thousand foreign-originated allowances being surrendered from Hungarian accounts. This contradiction is due to the fact that units sold or purchased in a given year were not used in the same year.

These conclusions, as well as a comparison of data broken down by year, clearly show that there is a time lag between the allocation and utilization of emission allowances. Registry data reflect the actual scheduling of the transactions, while CITL data quantify the allowances surrendered in a given year. The comparison of the data confirms that companies – both in Hungary as well as abroad – made use of the flexibility in timing that the EU ETS allows for. *Companies both banked emission allowances, delaying their utilization until later years, and borrowed units from the allowances of the following year.*

Experiences during the EU ETS Pilot Phase

The EU's CO₂ emissions trading scheme represents an entirely new approach, both from the perspective of parties regulated and from the perspective of regulators. The system called for a new approach on the part of all stakeholders. The dissertation examined whether expectations of the pilot phase were fulfilled. During the three years of the pilot phase, a new resource was created – the carbon emissions allowance. Hungarian entities established the necessary institutional framework and oversight mechanisms. The Government of Hungary and installations obligated to participate in the scheme came to understand the workings of emissions trading. Producers are able to appropriately measure and track their emissions – this is a key result of the pilot phase: EU Member States now have reliable and verified emissions data available going back to 2005.

This new factor of production, however, failed to take root in individuals' mindset during the three years of the pilot phase. It did not become ingrained in corporate decision-making and company executives did not prepare for expenses related to the emission of carbon-dioxide.

Uncertainty surrounding new legal regulations made it difficult to adopt the system in Hungary. The EU ETS appeared to be unpredictable: regulations were still being put in place during the pilot phase itself, and decision-making on the EU level was not coordinated. Member States did not observe deadlines. At the same time, a pilot phase, which was far shorter, to begin with, than the timeframe necessary for implementing new economic decisions, did not aid the pricing of carbon emissions in business decision-making. The ability to plan ahead for the long term is vital for the scheme to succeed. It is important for companies to know that the effects of current investments aimed at reducing emissions will bear fruit in the long term.

Hungarian companies – due to more plentiful allocations than may have been necessary – were able to realize significant profits in the short term. The long term, however, is a different situation; starting in 2012, the European Union plans to significantly reduce the amount of grandfathered allowances. It is important to note that if the percentage of CO₂ emitting industry increases in the medium term as a result of lower production costs, it is to be expected in the long term that the competitiveness of this industry will drop (as a result of necessary environmental protection investments). Alternatively, the industry may be shifted east, outside the coverage of the EU ETS. This strategy would simply mean delaying necessary expenditures, and would mean doing so through a less than practical economic approach as far as the future is concerned.

The operation of the EU's carbon-dioxide emissions trading scheme is a valuable experience on the road to the establishment of a global CO₂ market. On the whole, the EU Emissions Trading Scheme brought about the realization of a common European carbon market.

Countries did not establish their own, isolated and compliance-focused, national trading systems. It was not countries but companies, which participated in the trading, and – regardless of nationality – they worked to either sell their surplus or obtain additional allowances through the common European market. The decentralized and liquid carbon market established an effective trading scheme, with minimal transaction costs. Hungarian companies were party to this in the same way as Western-European – and already highly experienced – corporations.

4. The Fulbright experience – Acknowledgement

Fulbright is quoted as a “trademark of excellence”. During my entire stay I felt that being a Fulbrighter often attracted the reaction “WOW”. I was proud to be there, to have this opportunity, to represent Hungary and to be part of such a wide international network. In sum, the research grant I received for 2007/2008 was a great success for me professionally, socially and culturally. I benefited from it tremendously not only for my carrier path but also on a personal level. I am so grateful for this fantastic Fulbright experience!

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6 The actual price is not public, estimates are between 13-15.

7 Kerekes, S. (2007): Basic Theories of Environmental Economics (“A környezetgazdaságtan alapjai”), Aula Kiadó, Budapest and Lesi M. – Pál G. (2004): Regulation of the emissions of Greenhouse Gases and effects of regulation on electricity producers in Hungary (“Az üvegház hatású gázok kibocsátásának szabályozása, és a szabályozás hatása a villamosenergia termel vállalatokra Magyarországon”). PhD Dissertation, Budapest

8 EUA: European Union Allowance, the emission unit of the EU ETS which allows for the emission of one ton of CO₂

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