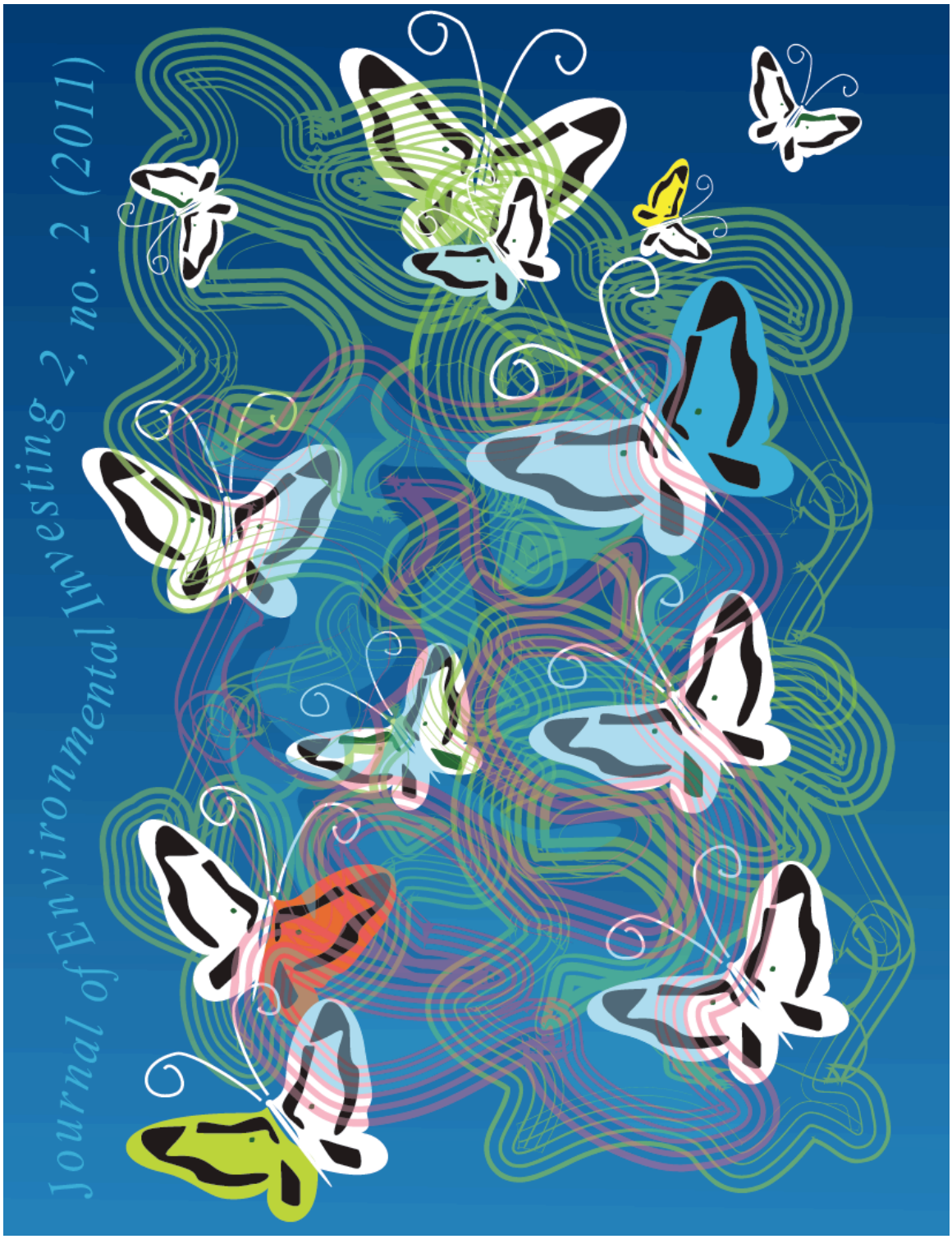

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Supporting New Scholars of Environmental Investing

Angelo A. Calvello, PhD
Editor in Chief

In 2009, a group of like-minded individuals discussed the challenges and necessity of engaging the academic, investment, and governmental communities in a rigorous discussion of the various topics related to environmental investing. The result of our concern was the creation of the *Journal of Environmental Investing (JEI)*. As we inaugurated the *JEI,* we also discovered a critical need to encourage new scholars to participate in this discussion. With the support of the *JEI*'s sponsor, BE Bio Energy Group, and a small but enthusiastic group of cohorts, I was able to establish a not-for-profit organization, the Journal of Environmental Investing Scholarship Program (JEI SP). I also was able to solicit the support of some key individuals to join the JEI SP board: Christine Chan, PhD, founder, Chan EC; Matthew J. Kiernan, PhD, founder and chief executive of Inflection Point Capital Management; Alex Rau, PhD, a founding partner of Climate Wedge Ltd; Steven Timmons, executive vice president human resources at ValueOptions Inc.; and Katherine Burstein, an associate with Mercer's Responsible Investment team in New York. Together, we created the JEI SP. Its goal is to encourage and support young scholars in developing and deploying market-based solutions to our most pressing environmental problems through rigorous interdisciplinary scholarship.

To ensure the integrity of the scholarship program, we created a blue-ribbon selection committee comprised of gifted scholars and practitioners from a cross section of the disciplines associated with environmental investing. I'd like to thank Dr. Alex Rau for chairing this committee and all the members of the committee for their conscientious commitments and diligent contributions. I'd especially like to thank Professor Patricia Widener for writing the cogent introductory essay to the three papers we are publishing in this special issue.

The JEI SP Selection Committee

Chair: Alex Rau, PhD, principal, Climate Wedge
Paul Clements-Hunt, head of unit, United Nations Environmental Programme Finance Initiative (UNEP FI)
Danyelle Guyatt, PhD, investment manager, Catholic Super Fund in Australia
Russell Read, PhD, deputy chief executive officer and chief investment officer for the Kuwait-based Gulf Investment Corporation
Nick Robins, head, HSBC Climate Change Center
Anthony W. Ryan, CFA, chief operating officer, Arrowstreet Capital
Shachi Sharma, PhD, head of business development, Syngenta
Patricia Widener, PhD, professor, Florida Atlantic University

In this issue, we present the 2010–2011 JEI SP winning paper "Challenges and Opportunities: Using Carbon Finance to Scale SMEs in West Africa" by Amrita Vijay Kumar, MBA, MS. I was pleased to present the JEI SP $3,500 award to Ms. Kumar on behalf of the scholarship committee and to discuss her research and goals for the future during a recorded interview. (Watch the video interview with 2010-2011 scholarship winner Amrita Kumar at http://www.youtube.com/watch?v=dnisIyzk6KQ.)

We envision the 2010–2011 scholarship as the first of many scholarships we award over the years to come. We would like to increase our reach into the academic community and offer our resources to more graduate students. To do so, we need your help. Please tell others of our efforts to bring recognition to the young scholars who will be analyzing and creating opportunities for environmental investing far into the future. In addition, we are currently exploring partnerships with similarly supportive organizations, and welcome any interest from educational, private, and public groups that would like to join our efforts in promoting relevant areas of academic study. And in all cases, please support those students pursuing academic research on environmental investing. Our future is tied to their commitment and success.

Thanks for your continued support,

JEI's Scholarship Program Motivates Students' Efforts toward Practical Solutions

Patricia Widener, PhD
Assistant Professor, Department of Sociology, Florida Atlantic University

Proposing market-based solutions for some of the world's most pressing environmental problems is no easy task. Implementing those ideas in practice and in such a manner that serves and sustains communities, economies, and the environment is an even more daunting assignment. Yet seeking to do both, the *JEI* launched the Scholarship Program (JEI SP) to encourage graduate students from across the disciplines to craft original investment ideas that could facilitate capital flow toward effective and promising solutions.

The call attracted papers from 20 nations, and three student-scholars were recognized for their efforts. An eight-member selection committee evaluated submissions based on the quality and originality of the students' research as well as the practical merits and significance of their research to enhance environmental investment. More broadly, this scholarship program is an effort to galvanize industry support for graduate student research, to ease students into the external assessment of their ideas, and to facilitate a broader discussion of novel ideas that is inclusive of academia, investing practitioners, governments, and industries. With the publication of their preliminary work in this special issue of the *JEI*, it now rests on us to engage, to debate, and to test their contributions. In other words, how can the *JEI* community assist these student-scholars in deepening their analyses of the possible benefits and burdens of their recommendations on the affected communities, local economies, investors, and local and global environments?

Amrita Vijay Kumar, the winner of the scholarship program and the $3,500 award, is a student of the Erb Institute of Global Sustainable Enterprise at the University of Michigan. In her paper, she assesses the use of local and international carbon finance schemes to produce energy-efficient household cookstoves in Mali and Ghana. The community, especially women and children, would be served by reducing their dependency and expenses on charcoal, while simultaneously reducing their exposure to deleterious charcoal smoke. In her analysis, Kumar identifies three key challenges to successfully implementing these cookstoves: 1) maintaining financial and production commitments, 2) keeping production local or regional, and 3) increasing household use. Each point identifies the critical links between local and global carbon finance efforts, local and global production models, and the impacted communities in sustaining ideas that may reduce carbon emissions, while improving community and economic wellbeing. Yet the challenge for scholars, investors, and development aid workers is identifying a case study,

such as rural households in Africa, while maintaining an awareness, dialogue, and emphasis on large-scale industrial emissions and wealthier consumption patterns that may have far greater impact on the global environment. Kumar's analysis also leads us to develop questions—in order to improve the product, to serve the community, and to advance a collective dialogue on market-based solutions. Those queries encourage us to seek clarification on: 1) why households continue to use both traditional and energy efficient cookstoves, and how to improve the new stoves to meet the cooking standards of the old ones; 2) how the investors could better protect and/or guarantee local labor at fair wages in the production of the new stoves; and 3) how the lifespan of the stoves could be tested so as to indicate whether they are as long-lasting, if not longer lasting, than the traditional stoves, so as to reduce the ecological costs of production and the household costs of purchasing. A well-researched paper inspires interest, discussion, and the possible contribution of others, and this one did.

The second student paper is by Anastasia Sagalovitch, a student of public service management at City College, City University of New York. Sagalovitch explores how emission trading achievements in the private sector (in this case, BP) and in the public sector (of Texas and Tokyo) may offer critical guidelines—or at least tested options—for New York City's municipal government in reducing and financing the reduction of CO_2 emissions in public buildings. Her work reminds policy makers and investors of the importance in assessing the strengths and weaknesses of a range of previous efforts by public and private entities in local, regional, and international places so as to construct the most viable best practices. Sagalovitch's balanced comparisons also serve as a counterpoint that cautions the public and private sectors to consider the particular nuances of a place in terms of its political economy as well as its social, historical, and cultural qualities—before implementing emission trading options. As a final note on Sagalovitch's work: embarking upon the reduction of New York City's greenhouse gas emissions is a clear indication of an intrepid researcher.

Saltanat Sabitova presents the third paper, which focuses on Kazakhstan, with editorial help from Anna Zmerzlaya. Sabitova, a student at Justus-Liebig University of Giessen, Germany, and Zmerzlaya, a lecturer at the Utrecht School of Economics in the Netherlands, analyze the applicability of the EU model on emissions trading for Kazakhstan and the feasibility of putting it into operation. Comparable to Sagalovitch's work on using the experiences of others to inform a richer assessment of potential emission reduction options, this idea of cultivating the successes of others while avoiding their failures is of particular significance for Kazakhstan leaders in advancing their own domestic efforts. A challenge for anyone taking on such a task is the relative newness of any national model, including the EU's model for trading. Many efforts are so recent that current, long-term analysis is unavailable at this time, and therefore the suitability of their

application is also unknown. This situation presents both an opportunity and an obstacle for leaders of any post-Soviet, developing, low-income, or newly independent nation: Should they chart their own course independent of European or North American models—a course that may be superior to existing examples—or pattern domestic strategies after the preliminary efforts of others? These two researchers also remind us of the importance of knowing the local, social, and cultural distinctions of a place and a people when proposing market-based solutions for environmental problems, a point substantiated by the works of Kumar and Sagalovitch as well.

Patricia Widener is assistant professor of sociology at Florida Atlantic University, and author of *Oil Injustice: Resisting and Conceding a Pipeline in Ecuador*. She can be reached at pwidener@fau.edu.

Challenges and Opportunities: Using Carbon Finance to Scale SMEs in West Africa

Amrita Vijay Kumar, MBA; MS

Abstract

The International Financial Corporation (IFC) estimates that small and medium Enterprises (SMEs) provide from 50% to 60% of employment worldwide. In addition, many of these enterprises provide basic goods and services, including energy, water, and education to local communities. These SMEs or social enterprises, as they are sometimes referred to in development circles, present a significant opportunity to reach masses of rural and urban poor living at the base of the economic pyramid. They are also channels through which socially responsible investors deploy cleaner, sustainable, distributed technologies at scale by using innovative mechanisms such as carbon finance.

This article describes the lessons learned from three months of field research, desk research, and interviews in Mali and Ghana, and the expert input of Erik Wurster of Up Energy (and formerly of E+Carbon), and Toyola Enterprises Limited (TEL). Traditionally, the overall cost of carbon project development has made only large-scale implementations of carbon projects viable. As a result, carbon finance has mainly been used to finance large-scale renewable energy projects or industrial infrastructure upgrades. Very rarely do these projects directly benefit the people who need access to clean energy the most.

E+Carbon is, however, piloting a new carbon methodology to scale efficient cookstove enterprises in West Africa by bundling and aggregating carbon projects across geographies. This programmatic approach to carbon projects is yet to be proven but is showing early signs of success. However, project development in emerging markets is not without institutional, financial, and cultural challenges. Managing a carbon project requires technical assistance, up-front capital costs, and a strong risk appetite. New methods of risk sharing with rural banks and microfinance institutions (MFIs) are being used to defray some of the liquidity constraints faced by SMEs and could be extended to carbon financing. Finally, mobile technology platforms are showing potential for scale and could significantly reduce costs, increase transparency, and ease the labor involved in verification of credits.

Challenges and Opportunities: Using Carbon Finance to Scale SMEs in West Africa

Small and medium enterprises (SMEs) in emerging markets are the engines of growth in their economies. Not only do they create jobs and social security, but they also fill the gaps in government infrastructure by providing basic goods and services to low-income communities. SMEs are beginning to tackle the energy infrastructure challenges in their countries by providing customized energy solutions to their communities. In many instances they are profit-making enterprises that provide services like energy, clean water, and mobile phone technology to rural communities. They are becoming important distribution channels through which small-scale, low-cost clean technologies are made available to people living at the base of the pyramid (BoP) (Prahalad 2004). But SMEs are often hindered by the lack of low-cost capital to grow their business operations. In order to fill this gap, a new breed of financial intermediaries is using *impact investments* (O'Donohoe et al 2010) to catalyze growth of SMEs while also achieving positive social and environmental results. In addition, a few of these intermediaries are pioneering the use of carbon finance along with their equity and debt investments to seed small-scale, disaggregated carbon projects that can generate environmental returns and benefit the local communities.

Objective

The objective of this analysis is to discuss the unique challenges of developing carbon projects in emerging markets for the benefit of local communities while generating social, environmental, and financial returns to the investor. The research draws on the author's work with E+Carbon's investments in West Africa. Specifically, the author discusses the institutional, technical, and financial challenges and describes the potential risk mitigating actions and opportunities for cost savings and partnerships.

Methods

The background research and inquiry was accomplished via fieldwork, desk research, and expert opinion interviews in July and August 2009. Specifically it included:

- Desk research (including primary and secondary data collection)
- Field research in Mali and Ghana
  - Expert interviews
  - Field observations (Kumasi, Eastern Accra, Bamako)

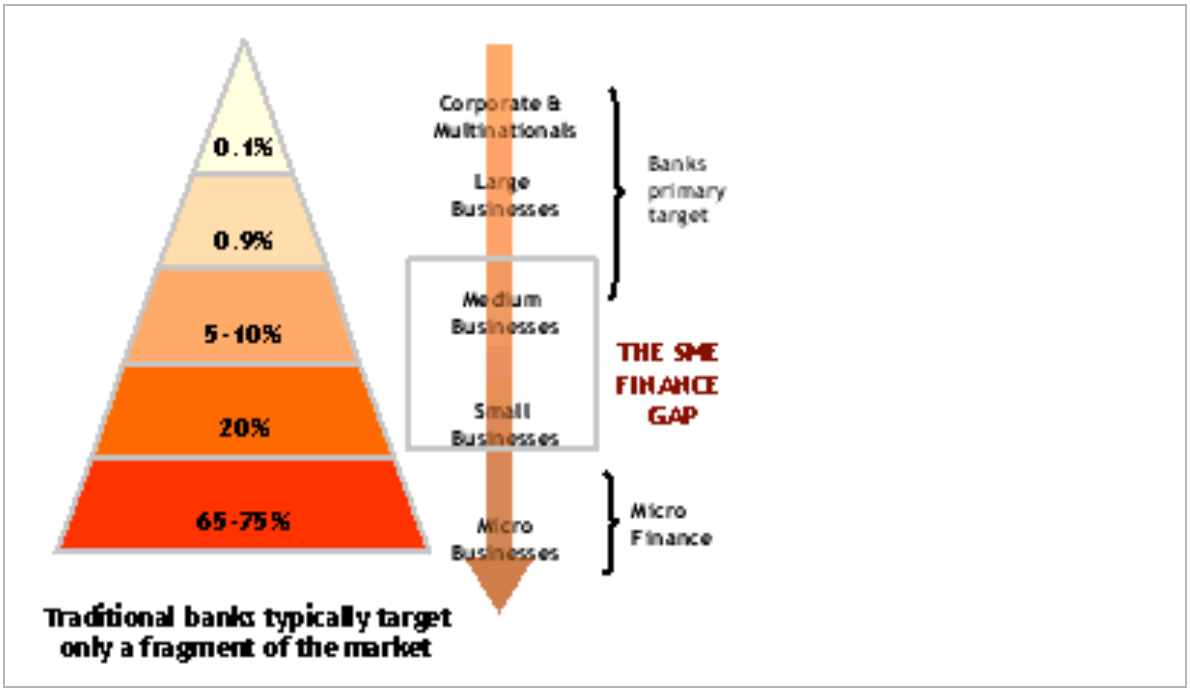
Financing Small and Medium Enterprises

As engines of growth in developing economies, SMEs are often critical for the economic and social development of emerging markets and play a major role in creating jobs and generating revenue for low-income people. Not only do they foster economic growth and social stability, but in many instances they also provide low-income communities with access to basic goods and services. More recently, they have become important channels for the large-scale distribution of many newer technologies such as solar power, water purification devices, and mobile phones. In recognition of their many catalytic impacts, SMEs have become the focus of various government and international aid initiatives. The IFC has provided a total of $8.5 billion worldwide as of June 2010 to finance micro, small, and medium enterprises (MSMEs). In fiscal year 2010 alone, the IFC made available $2.5 billion (IFC 2010).

The World Bank estimates that formal SMEs contribute an average 51.5% of GDP in high-income countries—but only 15.6% in low-income countries. By contrast, the informal micro-enterprise sector accounts for an average 47.2% of GDP in low-income countries, but just 13% in high-income countries. In large part this disparity has been attributed to the lack of access to financial services for SMEs. Private equity funding plays an important role in the development of private sector companies. While this funding has increased steadily in the past five years in developed countries (representing 2.3% of GDP in the U.K. and 1.7% in the U.S.), it remains at much lower levels in emerging markets (IFC 2008).

Private investors are held back by the high transaction costs, illiquid capital markets, regulatory risks, and poor legal infrastructure that is characteristic of most emerging markets today. As a result, SMEs are stuck in the "missing middle" (Figure 1). They are too big to be eligible for microfinance and are still too small to attract commercial capital at reasonable rates.

Figure 1: The Financing Gap



Source: "SME Banking," Global Financial Markets, *The World Bank Group: IFC, 2010.*

Investors are beginning to recognize the magnitude of this gap and the opportunity for investment in high growth SMEs. The IFC has paved the way for a new breed of investor to enter the growing SME financial services market. These intermediaries, often called *social venture funds,* provide growth capital and technical services to SMEs in an attempt to bridge the financing gap, and range from commercial entities like the IFC to nonprofits and socially minded angel-investors. Entities such as E+CO, Root Capital, and the Acumen Fund are pioneers in this emerging field, which is now widely referred to as impact investing (O'Donohoe et al 2010).

SMEs—Tackling the Energy Challenge in Emerging Markets

Huge capital investments will be required in the coming decades to meet the energy needs of developing countries. Climate change, dwindling fossil energy resources, and the pressure on the health of communities is driving momentum towards cleaner, renewable forms of energy. Financing this infrastructure development will be a crucial challenge in the coming decades. The United Nations Environment Program (UNEP) acknowledges two contrasting approaches—the investment in large-scale utilities approach, and the energy enterprise approach. (Kappen 2008). The former requires investment in large centralized utilities that build infrastructure, which in turn will foster enterprise. The latter fosters the creation of multiple distributed energy enterprises via investments in entrepreneurs who create localized energy infrastructure. The key advantage of the energy

enterprise approach is its flexibility in being able to provide customized solutions for local markets. It is for this reason that Kappen claims that the financing of energy SMEs is "the sensible thing to do while waiting for capacity additions and rural electrification." The European Investment Bank (EIB) is backing this approach and, to signify its intent, signed four loans in June 2009 in Serbia that benefit energy projects of SMEs, for an aggregate amount of EUR 139.50 million.

The EIB investments are part of a growing tide of investors seeking well-managed energy enterprises that are delivering clean energy in emerging markets. The investment thesis has gained much traction among impact investors who are seeking combined environmental, social, and financial returns.

SMEs and Carbon Finance

While impact investors continue to refine their investment strategies, a few innovative investors are experimenting with new business models that take advantage of financial mechanisms such as carbon finance, which is monetized via sale of credits into compliance and voluntary carbon markets. This intersection of carbon finance with private investment offers financial intermediaries a new method for leveraging their capital and improving their social, financial, and environmental returns.

However, carbon finance is a complicated tool, often poorly understood and implemented. It is inherently risky—with many regulatory risks and compliance and governance challenges—and requires strong technical capacity and financial support to implement successfully. Such risks and complications combined with the uncertainty of international policy addressing climate change and the lack of a viable carbon market beyond 2012 currently make carbon finance an unattractive investment to most investors. Furthermore, from an impact investor's point of view, even when the economics make sense they tend to favor large-scale industrial type projects that involve smoke-scrubber installations or renewable energy generation in which marginal costs are low and scale is easily achieved. While these projects reap significant environmental benefits, they very rarely directly benefit the local people or their communities.

E+Carbon is a social enterprise founded in 2007 by E+Co to leverage carbon finance for the purpose of reducing poverty and mitigating environmental degradation. E+Carbon commercializes carbon assets arising from the cost-effective, life-altering end user technologies that abate large quantities of greenhouse gas emissions. E+Carbon's primary focus is on efficient biomass cookstove projects, which offer the added benefit of significantly improving public health and mitigating deforestation. E+Co has realized the potential for carbon finance to grow smaller scale, distributed energy projects. Unlike more traditional carbon finance developers however, E+Co strives to ensure that dollars

flowing from carbon credits make it to the bottom of the pyramid. To that end, the organization announced in 2009 that it successfully registered two energy efficient cookstove projects with the Gold Standard, a Swiss-based nonprofit organization that serves as a governing body for Verified Emissions Reductions (VERs). These are among the first such projects ever registered with the Gold Standard.

E+Carbon is signaling a trend that is forcing many development and venture philanthropy organizations to take a closer look at carbon finance and how it fits into their portfolios. Despite its complexities, carbon finance offers the patient investor and the philanthropist a unique opportunity to achieve both financial and environmental returns at scale. When done right, it provides a steady cash flow over a 20-year period and can result in the SME becoming less reliant on expensive debt or equity capital. It can also increase an investor's appetite to extend debt to an SME by acting as collateral for nascent SMEs with few tangible assets. Carbon finance has the twin benefits of providing cleaner energy to the poor while providing a return on investment at market rates to investors. However, the projects are not without significant risks and institutional challenges.

Deploying Carbon Finance to Scale Efficient Cookstoves

Wood and charcoal meet 75% of Ghana's fuel requirements. The practice of cooking with biomass is one of the main reasons behind the demand for wood fuel, and it contributes to an annual harvest volume of 29.4 million m^3 of wood in the country.

The Opportunity: A Compelling Social Investment

TEL, an E+CO investee, has been manufacturing and distributing efficient charcoal cookstoves as a means of tackling this problem. The Toyola Coalpot has a ceramic liner and burns charcoal more efficiently than traditional cookstoves, saving the user valuable expenditure on charcoal while reducing the amount of smoke emitted during cooking. The company has manufactured and distributed more than 130,000 stoves in Ghana since December 2007. These energy efficient cookstoves are important for a number of reasons. They are 40% more efficient than traditional stoves, thus significantly reducing the amount of charcoal that is used for cooking. The World Health Organization (WHO) estimates that indoor air pollution is responsible for 1.5 million deaths a year due to pneumonia, chronic respiratory disease, and lung cancer. This death toll falls disproportionately on women and children, who spend a lot of their time near fires. Indeed, more than half of the victims are children under the age of five. A third are women. To achieve the UN millennium development goals by 2015, 485,000 people will need to gain access to cleaner fuels every day for the next 10 years.

Carbon Finance as an Enabler of Scale

Until recently, the biggest barriers to scale in Ghana's efficient cookstove sector were affordability (the ability of the customer to pay the retail price of the stoves) and availability of capital for the expansion of manufacturing and distribution capacity. Carbon finance has changed the existing paradigm. Efficient stove manufacturers, such as TEL can now potentially monetize the carbon that their stoves offset, thereby generating much-needed additional streams of cash. This revenue can enable the reduction of stove prices for the end consumer and also inject liquidity and investment into the business, thereby addressing the cookstove sector's biggest constraint to scale: capital.

TEL's cookstoves generate carbon offsets as they reduce the greenhouse gas emissions of the user—a result of the more efficient combustion process. As primary recipients of carbon revenues, stove manufacturers like TEL will now be able to finance large-scale production of efficient stoves. Carbon finance may also be used to subsidize the price of the stove, thus making it cheaper than its inefficient counterpart, another factor that will increase adoption. It could increase the income capacity of the large informal sector that makes up the stove industry—metal workers, ceramic artisans, sales agents and retailers—and yield health benefits for women and children, as indoor air pollution is reduced.

Cookstove Carbon Finance Economics

The price of stoves is 8 Ghana cedis (about USD 5) in the southern region of Ghana and approximately 13 cedis (about USD 8) in the North (2008 prices). The higher prices in the north reflect the higher cost of manufacturing and poor distribution infrastructure in the northern region of Ghana. This price is relatively high in comparison to that for traditional stoves (from 3 to 5 cedis) and it makes the Toyola coalpot unaffordable for the urban poor. However, gross carbon revenues over the three- to five-year life of the stove could range from USD 18 to USD 25 and could therefore subsidize the entire price of the stove, making it affordable and within the reach of an average rural customer in Ghana. Volumes make all the difference, however, as the cost of developing and bringing carbon credits to the market can range from USD 150,000 to USD 300,000. TEL and E+Carbon would have to sell 50,000 stoves just to break even. Projecting growth in the cookstove market from 1.83 to 2.35 million in Ghana over a 10-year period, TEL and E+Carbon are confident that the carbon finance economics make financial sense.

The opportunity to scale clean technologies in emerging markets using a similar carbon finance model extends beyond cookstoves. There is an opportunity to achieve similar success using solar lantern, biogas, water filtration units, or other technology that requires a price subsidy and/or significant capital investments to attain scale or adoption among low-income communities. Carbon finance, when deployed alongside growth capital and

technical assistance can become a significant point of leverage for an SME. It enables access to a steady stream of cash flows for a length of time and can be used as collateral to secure commercial finance that was previously unattainable.

Challenges of Developing Carbon Projects in West Africa

The following section outlines some of the challenges and risks that carbon developers and investors face when making investments in small-scale, distributed carbon projects. Although this understanding has been gained from E+Carbon's experience in West Africa, many of the challenges outlined are common to projects in any developing country context.

Complex Modalities and Procedures Lead to High Transaction Costs

Carbon projects are only eligible for revenues when the developer can prove that the project is truly additional, i.e., the reduction in greenhouse gas emissions by proposed project activities is additional to any reduction that would occur in absence of the project. The Marrakesh Accords state that a project activity is additional if anthropogenic emissions of greenhouse gases are reduced below those that would have occurred in the absence of the carbon project. The "additionality" proof is usually established within a Project Design Document (PDD), and it requires a high level of technical aptitude and knowledge of the different certification standards. This know-how is often not available in countries like Ghana and Mali in West Africa. As a result the process of writing a PDD is an expensive endeavor that usually requires the hiring of specialists to measure baseline emissions and the acquisition of technical expertise to measure and communicate about the reduction of emissions from the project activities. In the case of E+Carbon, the services of Impact Carbon and Berkeley Air were contracted to complete the first draft PDD and measure the specific amount of fuel consumed by a TEL and Katene cookstove. However all other aspects of the project development were managed directly by E+Carbon.

Once a project is registered and a PDD is written, external auditors need to be hired to certify the credits generated in accordance with certification bodies like the Gold Standard. Their requirements are rigorous and stringent, and adherence to them requires a high level of competence and technical capacity. While these external validations are not mandatory in voluntary markets, the certification increases the value of the credits and is often desirable from the point of view of a buyer.

Upfront Capital Costs and the Need for Bridge Financing

Carbon projects are risky ventures. A high upfront capital investment is required from either the SME or the project developer to perform the initial baseline studies, write the PDD, and perform feasibility studies. SMEs rarely have the capital to undertake such studies and, as a result, contract with project developers who take on this cost in exchange for a commission or revenue sharing of future carbon revenues generated. There is a risk that the project will not pass the inspection of certification bodies that qualify the credits for sale into either voluntary or compliance markets. This risk is generally borne by the project developer in exchange for a share in the downstream revenues.

Carbon revenues change the dynamics of a small business, forcing rapid expansion in order to maximize future revenues. For example, in the face of competition, a cookstove business in Ghana will have to rapidly saturate the 1.85-million stove market in order to secure future carbon revenues. A target of 80% market share within five years will necessitate the rapid expansion of production capacity to at least 300,000 stoves a year, matched by a simultaneous increase in distribution capabilities. The high upfront demand for cash is likely to outstrip the volume of initial carbon payouts, which are based on prior-year sales volumes, and may require the company to take on additional risk in the form of debt or pre-financing. This is likely to place significant demands on the management capacity and financial aptitude of the proprietors. Realizing cash in the bank from carbon offsets takes about three years from the time one first begins developing the carbon project, and then only arrives every year thereafter. Bridge financing becomes crucial in this intermediate stage, and it is at this point that investors can have the most impact, by providing capital while undertaking a reasonable amount of risk.

Transparent Revenue Sharing Agreements

The transparency of revenue sharing agreements with local entities is key to the long-term sustainability of the carbon market. In the absence of government policy, this is usually done via a negotiation between the SME and the carbon developer. SMEs rarely understand the dynamics of carbon markets or the risks involved and are therefore often unable to negotiate terms to their favor. End-users, the default owner of the credits (for household technologies like cookstoves) are sometimes left out of the carbon contract altogether. While this has led to a few unfavorable situations, it has also resulted in the creation of nongovernmental organization (NGO) sponsored third-party certification standards, such as the Gold Standard, which ensures that projects are developed ethically and meet the highest standards of transparency and good governance.

To mitigate these risks, clear contracts that explained the revenue sharing agreements were signed between TEL and E+Carbon. Contracts between TEL and its customers were also

established. All sales agreements included a note that explained to the customers that they were agreeing to sell their rights to the carbon to TEL in exchange for a product discount. Certification with the Gold Standard was also sought to assure investors that they were receiving high quality credits.

Institutional Capacity across Project Development Life Cycle

The Kyoto Protocol allows polluters in Annex 1 (developed) countries the ability to offset or neutralize their carbon emissions by investing in carbon projects in developing (Annex 2) countries. As a result, a number of enterprising carbon developers have started establishing projects in countries like Ghana and Mali, with the goal of bringing carbon offsets to the European compliance markets. However, the governments and officials in these countries do not always understand complex international treaties and the importance of close government supervision and legal agreements.

Government and Legal Infrastructure. When faced with a lack of clear policy and guidance on how carbon revenues will be taxed or shared with local entities, project developers should conform to the stipulations made by the UN and other certification bodies.

E+Carbon held educational and stakeholder meetings in Ghana and Mali that brought the different parties to the table and explained the costs and benefits of a carbon project to all those involved. Such a transparent process was crucial to securing the buy-in of artisans, government officials, and local NGOs.

Financial and Aggregation Infrastructure. Bringing carbon credits from development to sale through certification, validation, and verification and trading them on international markets requires a sophisticated financial partner. SME carbon projects are usually small-scale (in comparison) and require the services of a carbon finance specialist and an aggregator to achieve the scale necessary for trading in carbon markets. Such services are rarely available locally among financial institutions. Foreign brokers and third-party aggregators are required, which adds to transaction costs.

SME Capacity. Carbon projects have an extremely high implementation risk. The ability of the SME management to grasp the complex third-party requirements of monitoring and verification is crucial to the generation of high quality credits. The need to educate staff across the ranks from sales agents to accountants was crucial to the success of the TEL carbon project. Third-party auditors require the ability to verify that carbon offsets were generated as planned and have to track the amount of carbon offsets to specific program activities (like the number of stoves sold and currently in use). The need for random sampling requires an SME to have in place a sophisticated tracking process and the

capacity to retrieve data from sales in the past. To put this in context, many SMEs lack the ability to even generate financial statements on an annual basis to service their loan covenants. The added burden of carbon monitoring and tracking can be overwhelming and in most cases, impossible.

E+Carbon had to take an extremely hands on, labor-intensive approach to developing the institutional capacity of TEL to manage the carbon certification process. It has built up the technical capability for TEL to monitor sales down to individual customers in each quarter and has navigated the verification process through to registration of credits. This level of support is crucial to the success of a carbon project.

Carbon finance yields streams of revenue that are of a magnitude that some SMEs have never seen before. It creates unique social, cultural, and financial challenges that need to be addressed; for example, how cash flows are shared and distributed both within the SME and within the community in which it operates. E+Carbon's approach of empowering the entrepreneur with capital and technical assistance has proven results, but not all project developers have the same philosophy and many do not have the expertise and/or capacity required to gain trust, develop local businesses, and support entrepreneurs toward longer term sustainability. Technical assistance is therefore an absolutely critical aspect of any carbon project.

Unintended Consequences and Cultural Complexities

Carbon project development is as much an art as it is a science. Project developers write complex methodologies that specify the amount of greenhouse gases that will be offset with their project's activities. However, they cannot always account for cultural nuances and unintended consequences that often complicate project results. E+Carbon's experience in West Africa has yielded interesting observations.

Challenges with Changing Customer Behavior. Projects activities that require customers to make changes to their purchasing behavior or use patterns are often challenging. E+Carbon's cookstove projects required households to surrender old inefficient stoves in favor of newer efficient ones. However, customers use patterns showed that inefficient stoves were used in parallel with the newer ones, resulting in higher emissions than with only efficient stoves. Anecdotal evidence from initial field research in Mali suggests that cultural nuances may prevent the obsolescence of old stoves because many joint-family households simply tend to hold on to their older stoves for sentimental reasons. Similar evidence was obtained through first-hand observations in Ghana, where cultural norms often dictate re-use.

In the E+Carbon project, emissions reduction numbers account for parallel use of old stoves by using a paired Kitchen Performance Test that quantitatively measures reductions of household fuel usage both before and after switching to the efficient cookstove. Stove buyback promotions are also used to act as an incentive to counter this trend. Such considerations are important as investors and developers implement carbon finance to deploy cleaner technologies to households.

The Rebound Effect. Another question pertaining to consumer behavior is the potential magnitude of a rebound effect that is often associated with improvements in energy efficiency. As stoves get more efficient and customers become more affluent, developers need to consider that is it likely that they will start to cook more, thus negating the benefits from more efficient cookstoves. Developers should be aware of this risk and factor their emissions reductions tests accordingly to manage for such risks. E+Carbon's Kitchen Paired Test is designed to measure this change in user behavior.

Pressures of Scale. The availability of carbon finance creates an imperative to reach scale quickly. By saturating the available market, an SME can secure the future generation of carbon credits. This requires it to scale up manufacturing and distribution capacity. For TEL in Ghana, the eventual growth of sales to 300,000 stoves a year, might imply that the company could find it more cost effective to import metal sheets, stove components, or even entire stoves. As Chinese manufacturers bring the cost of cookstoves down, companies like TEL may contract their manufacturing from China. While this choice may be the most efficient use of capital, it may come at the cost of local employment and could endanger the jobs of local artisans who rely on stove metalworking for their livelihoods. Mission-driven investors need to pay attention to these unintended consequences and manage for the outcomes they desire.

Risk Management and Cost Reduction Initiatives

Carbon projects are extremely labor intensive, and certifications like the Gold Standard require detailed and rigorous tracking to verify the generation of credits or offsets. Vendors must maintain sales records that are later used by trained evaluators to follow up with stove owners about their fuel use and cooking habits. The stoves are sold in markets and door-to-door by Toyola "evangelists," individuals who record each sale in a notebook and then are paid on commission. Because 55,000 stoves were sold in 2010, the paper records are becoming increasingly difficult to maintain. As a result, carbon tracking and monitoring is extremely tedious and at times unreliable, given the lack of data.

Building Low-Cost Technology Platforms

As small-scale carbon projects are becoming more common, a few initiatives have started to demonstrate the viability of technology platforms that help aggregate and scale multiple projects. One such development is E+Carbon's deployment of the data collection and communication short message service, known as RAPID SMS, to pilot an SMS-based tracking of end users to facilitate carbon finance auditing. The system, called Carbon Keeper, was built by SMS programming expert Michael Benedict, with support from E+Carbon and others. With this simple technology, TEL evangelists can use fixed-format SMS messages to update a sales database directly from the field. The application was designed primarily to track sales for carbon recordkeeping, but it also offers limited supply chain management and back office functionality. Managers access the database through a web interface that provides aggregated statistics and the option to export an auditor-ready Excel spreadsheet of stoves sold.

This pilot project showed that there is real potential for technology platforms that use RAPID SMS to realize cost savings across the board, both to the SME and to the carbon project developer. Similar technology is now being used by Carbon for Water to collect 40,000 data records a day (Anoka 2011). The data is used to support Vestergaard Frandsen's campaign to distribute LifeStraw Family water treatment units to four million people in Western Kenya.

Sharing Risks and Securing Credit

SMEs often face liquidity constraints across their supply chains. Their supply chains are made up of informal, loose relationships with contract workers who often require up-front cash financing and payment in advance for production. Contract workers, as in the case of TEL in Ghana, are individuals who usually do not own bank accounts, pay taxes, or own any assets. They are often unable to access lines of credit or avail themselves of business loan services from traditional banks or lending agencies.

The inability to access credit impacts cookstove businesses like TEL since they rely on the contract workers to supply them with stove parts and to distribute their product. SMEs often have to provide cash advances before any raw materials can be sourced or before any inventory is produced. On the distribution side, retailers and sales agents also demand credit terms because they do not have cash reserves to finance stock purchases or to invest in distribution infrastructure. Therefore, a business like TEL not only has to provide its stoves on credit terms, but it also has to pay for transportation costs and invest in a transportation fleet. This liquidity challenge is typical for most SMEs operating in this context in West Africa.

As TEL increases the sales of its stoves, it will have capital outstanding from the credit sales to customers. Hypothetically, by the end of a year, TEL could potentially have as much as 250,000 cedis (approximately USD 150,000) worth of capital resting with its customers. This situation creates a very strong business case for partnerships with local rural banks or microfinance institutions that could finance business activities across the SME supply chain. The arrangement not only frees up capital but also allows business risk to be shared with financial institutions that have the capacity to absorb losses.

Such partnerships with MFIs that provide end-user finance are being piloted successfully by entities like ARC Finance and Micro Energy Credits. The pros and cons of the different types of financing arrangements for an SME like TEL are listed in Figure 2. These options should be evaluated for different SMEs, given the specific in-country context, the maturity of MFIs, and the availability of rural credit.

Figure 2: Evaluating Different MFI Financing Arrangements for SME (TEL)

	End-User Finance	MFI as Point of Sale	Financing Sales Agents
How It Works	• Introduce customer to an MFI that finances the up-front purchase of product in exchange for repayments over time + commission.	• MFI purchase stoves from TEL and acts as distributor or point of sale. • MFI offer stove on credit or free to self-identified customers.	• MFIs provide credit to sales agents and evangelists, identified by TEL. • Sales agents and evangelists take on risk of repayment.
Pros	• Builds credit history of customer • Reduces TEL's credit risk	• Creates a new point of sale at MFI bank branches • Gives immediate cash to TEL for the stove sold	• Addresses liquidity concern of current distribution model • Transfers risk from TEL to the sales agent/evangelist
Cons	• Scale of MFIs is inadequate to serve all TEL clients. • TEL's target clients might be too risky for MFIs. • Administrative costs for MFI are too high for low priced stoves.	• Does not address the system-wide lack of liquidity • Banks might use stoves for their own promotions as a give-away and distort the market. • Unlikely to be able to match TEL sales volume	• TEL will likely be asked to act as a guarantor for a loan to sales agents. • MFI interest rate may be prohibitively high for sales agents.

Source: Amrita Vijay Kumar, 2009.

Conclusion

As small-scale, distributed, and programmatic carbon projects start to generate credits for investors like E+Carbon, they will undoubtedly start to gain acceptance among the broader investment and development community. It is critical that they do not loose their core attributes—transparency, local community buy-in, fair revenue sharing agreements, and long-term financial sustainability. Investors need to pay special attention to the key risks and challenges highlighted in the research while they perform due diligence across all aspects of the project life cycle in order to gain confidence that their investments are both socially responsible and financially viable.

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Biography

Amrita Kumar enjoys working at the intersection of finance, business, and sustainability. She has worked with organizations across the public and private sector to identify, finance, and scale their triple bottom-line initiatives. She is an advocate of using private investments as a tool to enable social and environmental change, a product of her experiences with Piper Jaffray, the Environmental Defense Fund, Citigroup Growth Ventures, and E+Co, a social venture fund that channels investments to environmental entrepreneurs. She has also worked on pioneering carbon finance projects that have helped prevent deforestation in Indonesia and have scaled cookstove businesses in West Africa. Previously, Amrita was an Assistant Manager with PricewaterhouseCoopers in Singapore. She is a recent Fellow of the Erb Institute for Global Sustainable Enterprise and graduated from the University of Michigan in 2011 with an MBA and an MS in Natural Resources.

Instituting a Municipal Government Emissions Trading Scheme in New York City: Applying the Model of Metropolitan and Internal Emissions Schemes

Anastasia Sagalovitch, MPA

Abstract

This article explores two cases of confined emissions trading schemes, one implemented by a private firm and another implemented by a municipality with the aim of applying this to New York City's municipal government. Emissions trading schemes can be used at a confined level, such as a city or firm, to implement greenhouse gas reductions. The process of measuring emissions, implementing a cap, and allocating permits all play key roles in determining the success of a scheme. When done well, the constraints imposed by an emissions cap and the opportunity to be compensated for emissions reductions projects catalyze the implementation of projects that may otherwise have been left undone. Supplementing such a scheme with a capital fund, such as a revolving loan fund, can defray the risks associated with up-front project costs.

Instituting a Municipal Government Emissions Trading Scheme in New York City: Applying the Model of Metropolitan and Internal Emissions Schemes

Reducing carbon dioxide emissions at the city level is a priority in New York City as evidenced by the city's commitment to reduce citywide emissions by 30% below the 2005 level by 2030, and with a specific reduction of 30% below the 2006 level by 2017 within the city government (Dickinson and Desai 2010, 5). Implementing a municipal government-level emissions trading scheme would facilitate the process of achieving these goals. The metropolitan government of Tokyo has recently instituted a mandatory emissions trading scheme, which includes both private and public participants, after a voluntary attempt to elicit emissions reductions (Padeco 2010). Precedent already exists for the effect of internal emissions trading schemes as evidenced by BP's experiment between 1997 and 2002 (Victor and House 2006). The lessons learned in Tokyo's attempts to garner reductions and BP's experience in achieving emissions reductions eight years ahead of schedule without negatively affecting the firm's financial position are examined below as a potential model for New York City to adopt.

Precedent: Metropolitan and Internal Emissions Schemes

The following section provides an overview of a municipality-instituted emissions trading scheme that affects both private and public institutions and an overview of a private firm's implementation of an internal emissions scheme.

Tokyo's Metropolitan Emissions Trading Scheme

The Tokyo Metropolitan Government (TMG) instituted a citywide emissions trading scheme (ETS) in 2008 by focusing on carbon dioxide emissions from energy use in office buildings, commercial spaces, and industrial facilities (among others) that had the largest emissions within the metropolitan region (Padeco 2010, 2-4). The emissions cap applies to both private and public institutions. The scheme went into effect in April of 2010, with the first trades anticipated for the spring of 2011. The scheme is being implemented to achieve a broader goal set by TMG of reducing carbon dioxide emissions by 25% below 2000 levels by 2020 (Padeco 2010, i).

The criteria for inclusion in the scheme are based on crude oil equivalent use per year (Padeco 2010, 2-4–2-6). For single, large-scale facilities, the use of more than 1,500 kiloliters (kL) of crude oil, equivalent for one building, meets eligibility for the cap. Medium- and small-sized firms with a combined use of over 3,000 kL of crude oil, equivalent per year across multiple buildings but no more than 1,500 kL of crude oil per

building, on the other hand, do not qualify for a cap on emissions but must submit a yearly energy efficiency report, which is made publicly available. For firms consuming less than 1,500 kL of crude oil equivalent per year, the report is voluntary.

The baseline for emissions reductions for the largest firms was calculated based on an institution's average emissions during three years (chosen by the firm) between 2002–2007. The first phase for reductions is from 2010–2015. Institutions that do not source more than 20% of their heating and cooling from district plants must reduce their emissions by 8% below their respective baseline during this phase Institutions that procure more than 20% of their cooling and heating from district plants must reduce their emissions by 6%. Factories are also required to reduce emissions by 6%. (Padeco 2010, 2-6).

All participants are required to reduce emissions by 17% during the second phase, 2015–2019 (Lee and Colopinto 2010, 4). In compliance with the cap, participants submit yearly reports detailing emissions. The reports are audited at the participants' expense (ibid., 5).

Emissions permits are awarded based on the following formula:

[Base Year Emissions - Required Reduction (6% or 8%)] x Compliance Period (5 years) (Lee and Colopinto 2010, 4).

This means that firms that do not reduce their emissions by the required amount during this period will need to purchase additional permits via the trading scheme from other participants. If a participant does not purchase the requisite permits, it would be fined approximately USD 5,500 and required to pursue additional reductions beyond their gap (ibid.). The idea is, as in all emissions trading schemes, participants who are able to reduce their emissions more efficiently (less costly) will do so. Those who do not find it economically feasible at that point to reduce their own emissions will enable other firms and or participants to reduce their emissions further by buying permits from them. In this way, emissions reductions are incentivized. Because of this incentive, participants who otherwise might not have thought about reductions can dedicate time and capital to this cause. Although only large-scale energy users are required to comply with the cap, any institution can undertake reductions and sell its emissions credits (Padeco 2010, 2-9). In addition, participants may buy up to one third of their credits from sellers outside Tokyo (Lee and Colopinto 2010, 5). Another option is to buy renewable energy credits associated with two other programs run by the Tokyo Metropolitan Region, one that gives credits to commercial clients for installing renewable energy options and another that gives credits to residential installation or upgrades of renewable energy projects (ibid.).

Trades take place over a website set up by the municipal government but funds are transferred directly between buyer and seller (Padeco, 2010, 2–9). The website lists contact information for those firms that wish to buy or sell emissions permits, similar to a bulletin board. Banking, or carrying emissions permits from one year into the next, is allowed in this scheme; borrowing, or covering gaps in hindsight, is not allowed (Lee and Colopinto 2010, 5).

A case study compiled by the World Bank identifies key areas that made this emissions scheme possible (Lee and Colopinto 2010, 5–6). One is that the municipality had already required emissions reporting several years prior. Additionally, the region had experimented with a voluntary emissions reductions program. As a result, the municipality was already aware of the scale of emissions and the reduction potential. Finally, the municipality saw the involvement of stakeholders as key to implementing the mandatory initiative.

BP's Internal Emissions Cap and Trade

In 1998, BP announced that it would reduce its own emissions by 10% below 1990 levels by 2010 through the use of an internal emissions trading scheme. Preparations began as early as 1997 as the firm conducted its own greenhouse gas emissions inventory for several years past (1990, 1994–96, 1998). BP also polled its business units and determined that these reductions could be largely achieved without cost to the firm. Firm-wide trading, with the exception of a small number of units, began in 2000. (Victor and House 2006, 2102).

The initial cap was designed to cut 1% of projected emissions in each upcoming year. Permits were allocated based on each unit's emissions volume in 1998 (ibid.). The first year's emissions cap projected more emissions growth than actually occurred, so the cap did not provide an effective restraint (ibid., 2103). During the second year, management revised the permit allocation to 91% of each unit's 1998 baseline emissions (ibid., 2104). The entire 10% reduction goal was achieved at the end of that year (2002)—eight years ahead of schedule.

Business units traded emissions permits with each other through an internal website; however, no physical funds were exchanged. Instead, a side accounting system was set up to keep track of the transactions. Participants were allowed to communicate with one another about permit availability and demand. Business units also had access to a capital fund for the purpose of implementing qualifying emissions reductions projects. The fund was initially capitalized at $50 million; however, it was reduced to $25 million

(ibid., 2103). Of the 112 total business units at BP, only 18 units were excluded from trading based on their impact (small), and 26 units that were part of the scheme never traded (ibid., 2105).

Several notable things happened during this process. First, the business units undertook only cost-neutral upgrades or initiatives. The significance of this is that the firm achieved its goal without having to take any financial losses or costs because the projects paid for themselves. This also means that if the firm was willing to take on financial costs, the scheme could have had a significantly greater potential to reduce emissions. Second, the firm decided to stop the scheme once the 10% goal was achieved. At that point, business units reported that the permit price in the market was higher than the marginal cost of emission reduction projects (Victor and House 2006, 2108), meaning that the cost per permit was higher than managers' calculations of the cost of eliminating the same unit of emissions in their operation. Managers thought that this occurred because efficient business units that had extra allowances to sell were withholding them from the market (ibid.). It is unfortunate that the experiment ended at this point, for the elevated price point might have prompted business units to take on more significant reductions beyond the proverbial low-hanging fruit. Third, as per the theory behind setting up an emissions trading scheme, less efficient units bought credits from more efficient units. In this way, units undertook reductions in which those actions made the most economic sense. Therefore, the firm was able to achieve its goals while minimizing costs. Given the current economic climate, this kind of approach could be greatly appreciated by the public sector.

New York City: Potential for Municipal Government-Level Emissions Trading Scheme

New York City plans on reducing its municipal government emissions by 30% below current levels by 2017 (Dickinson and Desai 2010, 5). New York City measures citywide and municipal emissions each year. According to the latest inventory, close to 78% of carbon dioxide equivalent emissions in New York City are from buildings (ibid., 23). Similarly, buildings comprise 64% of carbon dioxide equivalent emissions at the municipal level (ibid., 29). This means that, as in the Tokyo example, emissions from buildings would be a relevant focal point for a municipal government-level emissions trading scheme in New York City. New York City has a broader plan, PlaNYC, to institute sustainability initiatives across the city, as well as a specific plan tailored towards reducing energy use and emissions in municipal buildings (Dickinson and Desai 2010).

With the advent of a trading scheme, agencies would have an added incentive to dedicate time to emissions reductions projects because of the opportunity to receive capital. As in the case of BP's internal scheme, existing staff could be trained to administer each

agency's accounts. Because of the mandatory cap, agencies that would otherwise pass up the opportunity to implement emissions reductions projects would be able to leverage their internal efficiencies for the benefit of the entire city government.

Incorporating a Green Revolving Loan Fund

However, given that initial projects would need upfront capital, the city could reduce the burden on agencies by making a revolving loan fund available to them expressly for emissions reductions projects. Much as BP made a capital fund available to its business units, this fund would allow agencies to actually implement projects, thus de-risking (to some extent) their upfront investments.

A revolving loan fund would allow various agencies to borrow funds and then replenish the fund by repaying their loans so that other agencies could follow suit. A revolving loan fund in combination with the emissions trading scheme would function as a hedge to the common "unfunded mandate" dilemma of achieving programmatic results in government.

One successful example is the Texas LoanSTAR fund, or "Loans to Save Taxes and Resources" (Sifuentes 2009). In operation since 1988, the fund targets state and local governmental buildings, including public schools. Initially funded with $98.6 million, the program has lent out more than $223 million for financing more than 182 projects in the first twenty years. This represents "revolving" or re-using the initial funds 2.3 times (ibid.). The main target is energy efficiency, although funds can be used for projects including: energy efficient lighting, water conservation, insulation and window film improvements, energy efficient lighting, high efficiency heating, ventilation and air conditioning (HVAC) systems, and energy management systems. Past recipients include UT-Austin, Texas A & M, the University of Texas at Arlington, the Fort Worth and Victoria Independent School Districts, the Ward Memorial Hospital in Monahans, the University of Texas-Pan American and the Texas State Technical College in Harlingen as well as state-owned buildings at the Texas Capitol Complex, in Houston, Midland, and Nacogdoches (Reed 2009, 38). As of 2004, the projects in the fund's portfolio have saved more than $152 million in energy bills, and are projected to save $250 million in the next 20 years (Sifuentes 2009). In the fourteen years since 1990, projects have reduced more than 1.6 million tons of carbon dioxide (CO_2), 3,700 tons of sodium dioxide (SO_2), and 5,700 tons of nitrogen oxide (NO_X) emissions (ibid.).

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Biography

Anastasia Sagalovitch recently graduated from the Public Service Management program with a Masters of Public Administration and a concentration in environmental policy at the City College of New York. She hopes to help deploy renewable energy technology and further develop sustainable markets in this field by working at the intersection of the public and private sectors. She has investigated the use of feed-in-tariffs in promoting renewable energy deployment and has completed an internship at a New York City commissioned incubator with a dual mission of supporting clean technology start-ups and developing a clean-technology entrepreneurial community in New York City. She received a graduate fellowship from the Colin Powell Center for Policy Studies, where she investigated the use of revolving loan funds to implement clean technology projects at the municipal governmental level.

EU ETS Framework for Establishing a Domestic Emissions Trading System in Kazakhstan

Saltanat Sabitova, BSc, MSc

Abstract

This paper focuses on implications from the European Union's Emissions Trading Scheme (EU ETS) experience for establishing a similar system in Kazakhstan. It is expected that the domestic scheme will become integrated with state measures to reach the present voluntary and future commitments within the framework of the Kyoto Protocol, which was ratified in Kazakhstan on March 25, 2009. The paper explains the background of the EU ETS, focusing on its advantages as they affect other governmental measures taken to reduce greenhouse gases emissions, and introduces Kazakhstan's framework for an emissions trading scheme in general as well as the current environmental initiatives within the Kyoto Protocol. It also examines the current structure of the EU ETS as a cap-and-trade system, focusing on the working mechanism of the scheme. Points to consider in adapting this system are highlighted and then the lessons that can be learned from the first (2005–2007) and the second (2008–2012) phases of the EU ETS are discussed. The paper concludes that the European Union's Emissions Trading Scheme indeed has valuable implications and may serve as a good experiment to follow. Questions not considered in the current draft of the domestic emissions trading scheme that may need to be taken into account are also addressed. Given all the benefits brought by the emissions trading scheme, it can be accepted as a good additional instrument in Kazakhstan that leads to cost-effective carbon saving technologies that reduce emissions.

EU ETS Framework for Establishing a Domestic Emissions Trading System in Kazakhstan

In the late 1980s and early 1990s, acid rains caused by the nitrogen oxides and sulfur dioxide emissions created a real concern for the United States. It pushed the states to seek effective ways to reduce greenhouse gas (GHG) emissions. The program of choice was the cap-and-trade system appended to the Clean Air Act of 1990, for the reduction of two pollutants causing the creation of acid rain (Quinn 2008). McLean (1997) also agrees that the market-based emissions trading approach was born in the United States within the sulfur dioxide allowance trading. Domestic carbon trading launched in the United States and followed by real emissions-reducing results could not leave the European Union indifferent to that system. Moreover, the Emissions Trading Scheme (ETS) led to incentives for the global community to adopt similar systems worldwide that would target GHG emissions reductions.

On March 25, 2009, the Kazakhstan government ratified the Kyoto Protocol, 10 years after signing the Kyoto Protocol in 1999 (*National Inventory Report* 2010). The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1997 in Kyoto, Japan, as a global agreement to reduce GHG emissions into the atmosphere. Countries that ratified the Protocol committed themselves to reduce their GHG emissions by 5.2% compared to the level in the base year 1990. The reductions for individual countries could vary from the average of 5.2%, based on their specific circumstances in producing fossil-fuel combustion. Countries that have quantitative commitments are allocated certain allowances for emitting GHGs in accordance with their emissions limit. Thus far, Kazakhstan has no reduction obligations under the Kyoto Protocol Annex-B list. However, it has declared voluntary commitments, which are reducing GHG emissions by up to 15% by 2020 and by up to 25% by 2050, relative to the level in 1992. With its recent ratification of the Kyoto Protocol, Kazakhstan now has a real option of trading GHG emissions reduction credits among the countries listed in Annex I of the Kyoto Protocol.

Kazakhstan is on its way to establishing a domestic carbon trading scheme by learning from the experience of foreign countries in this field. In 2009, the Ministry of Environmental Protection was appointed as the authority to coordinate implementation of the Kyoto Protocol (Resolution N1205 August 6, 2009). In the same year, the government appointed the Kazakh Research Institute for Ecology and Climate as the working body that provides implementation of the country's Kyoto Protocol obligations such as submission of national GHG inventories, preparation of national communications and so on (Order N258-п December 4, 2009). Part of the Kazakh Research Institute for Ecology and Climate mandate is to examine the future feasibility and implications of a domestic

emissions trading system in meeting Kazakhstan's potential future commitments under the protocol. A legally binding domestic emissions trading scheme (DETS) will be based on the cap-and-trade system recognized worldwide. In this way, the government intends to raise the interest of operators to move gradually to energy efficiency and low-carbon policy by their own initiatives.

Currently, a working group comprising representatives from government, industry, scientific fields, and NGOs is intensively discussing DETS. In order to avoid shortcomings faced by the EU and to be aware of lessons the EU learned during its first (2005–2007) and second phases (2008–2012) of the Emissions Trading Scheme, a series of negotiations are ongoing with some EU countries on capacity building, sharing experiences and attitudes, and installing appropriate software needed for market operation.

So, a major aim of the study is to investigate the EU's approach in adapting ETS. EU ETS may represent a "grand policy experiment" by being the first group to establish an international emissions trading system in the world (Kruger and Pizer 2004, 1). As the world's largest emissions trading market, the EU ETS may serve as a practical and valuable case study for the rest of the world. The interest in the EU ETS is obvious and may, to a great extent, be applicable for Kazakhstan. In addition, this paper may also contribute to the actual environmental paper database on Kazakhstan and be used as a starting point for future research.

What are the advantages of the EU ETS? What is the current greenhouse gas emissions' situation in Kazakhstan? What does the draft law on domestic emissions trading scheme include? How can Kazakhstan learn from the EU ETS before adapting it in the country? What are possible threats to Kazakhstan of establishing a domestic carbon-trading scheme? These are the main questions addressed in this article, which provides a broad overview of the EU ETS and its shortcomings, as well as Kazakhstan's legal framework for domestic emissions trading development and implementation.

The article is organized as follows. The first section sets the context for the discussion by providing an overview of Kazakhstan's current environmental initiatives within the Kyoto Protocol framework. The second section outlines advantages of the EU ETS, and the third explains design and operations of the EU ETS. The fourth section presents governmental plans for the domestic emissions trading system of Kazakhstan. The fifth section contains an overview of issues to be considered for the further development of the domestic emissions trading system, and is followed by lessons learned from the EU ETS in the sixth section, and then the conclusion in the final section.

Kazakhstan's Environmental Initiatives within the Kyoto Protocol Framework

Since ratifying the Kyoto Protocol, Kazakhstan has undertaken multiple attempts to submit quantitative commitments to enter the Annex B list of the protocol, where the commitment of each state is indicated. One year is left until the end of the first commitment period of the protocol, but it has not happened for Kazakhstan so far, due to the absence of quantitative commitments. In the recent 16th Conference of the Parties (COP16) held in Cancun, Mexico, Kazakhstan's initiative to become an internationally committed state was postponed once again (see "Summary of the Cancun Climate Change Conference" 2010). So for now it amplifies the importance of the voluntary long-term commitments Kazakhstan had already declared in the seventh session of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol held in Bonn in 2009. During that session Kazakhstan voluntarily committed itself to reduce its GHG emissions by up to 15% by 2020 and by up to 25% by 2050 relative to the 1992 level (for more information on the seventh session of the Ad Hoc working group see UNFCCC 2009).

It is important to mention Kazakhstan's unique status under the Kyoto Protocol as an Annex I country (the list of developed and industrialized countries) in accordance with the decision finally made at the Seventh Conference of the Parties in Marrakech (UNFCCC 2001). The status was legally acquired after ratification of the protocol on 26 March 2009.

One of the major steps made in accordance with the Kyoto Protocol obligations was submission of the first national greenhouse gases inventory in 2010 to the UNFCCC, according to Article 7 of the protocol. Over the past years, important amendments to Kazakhstan legislation were accepted as a set of measures for climate change mitigation:

1. The first Environmental Code of the country, N212-III, was issued as of January 9, 2007; it contains a special set of nine articles on regulation of GHG emissions.

2. The program "Zhasyl Damu" ("Green Development") for 2010–2014 N924, as of September 10, 2010, specified implementation of GHG reduction policies.

3. The Department of the Kyoto Protocol, under the jurisdiction of the Ministry of Environmental Protection, was established in accordance with the government's resolution N1205 dated August 6, 2009.

In addition to these, there are a range of measures aimed at increasing GHG awareness, programs to increase the public interest in low carbon and renewable energy sources, and training programs on adaptation to climate changes.

For the year of 2009, Kazakhstan spent 16.5 billion tenge (about USD 111.5 million) on environmental purposes (Ministry 2010). Refer to Figure 1 for the total emissions of GHGs in Kazakhstan for a period from 1990 to 2008, which is the most recent available data source.

Figure 1. Total Emissions of GHGs in Kazakhstan (million tons of CO_2-eqv.)

	GHG Emissions					
	1990	1992	2008	Change 1990-2008	Reduction target (-15% by 2020 compared to 1992)	Reduction target (-25% by 2050 compared to 1992)
Kazakhstan	338. 24	321. 68	245.86	-92.38	273.43	241.26

Source: Author's compilation and calculation of data taken from the National Inventory Report of Kazakhstan (2010).

Kazakhstan accounted for some 338.24 million tons of GHG emissions in 1990; by 2008, emissions decreased sharply by almost 92.38 million tons. The decrease was most likely due to the closing of several factories in the country.

However, Kazakhstan is now actively investigating other options for reducing emissions to comply with its present voluntary commitments and future commitments under the Kyoto Protocol. Establishment of a domestic emissions trading scheme deserves serious attention from the government. Bearing in mind that Kazakhstan possesses 3.4% of the world's oil reserves, it can be expected to establish an effective market-based mechanism.

Advantages of an Emissions Trading System

Why ETS after all? Grayling, Lawrence, and Gibbs (2005) agree that EU ETS is the single and most valuable tool among climate change mitigation mechanisms. As a key tool among Kyoto mechanisms, it reduces volumes of emissions, thus adding real importance to the efforts of the international community in mitigating the effects of climate change (Hood 2010).

When compared to the first alternative mechanism of a carbon tax, the main advantage of an emissions trading system is in certain effects for the reduction of GHGs, which the

taxation system cannot provide. The advantage of taxes lies with more certainty over the cost of pollution by fixing a price per unit of pollution; however, the risk of adjustments to the tax rate remains (Weishaar 2007).

Environment Business Ltd. conducted a study outlining the ETS advantage over carbon tax among 3,000 UK firms with over 500 employees. It came up with the result that reducing emissions by ETS is several times less costly than imposing or increasing a carbon- or emissions-related tax. The model covers a four-year-period from 2002 to 2006, and offers firms a choice to apply one of three ways to meet the government GHG reduction targets. As a result, reaching targets with trading turned out to be less costly than increasing the climate change levy. For instance, firms that reduced emissions by trading faced 133 millions of pounds while the climate change levy made firms pay 11,000 millions of pounds according to the model (see Environment Business 2001 for more information on the research model). In accordance with Pocklington (2002), EU energy taxation is mainly fiscally oriented and is not purely intended to reduce GHG emissions. The idea behind carbon taxation may be to increase state budgets.

In addition, ETS enables equalization of the opportunity costs of pollution control in a country. Even though different firms have different levels of pollution, they all face the same price for the cost of pollution per ton if they choose to purchase emission permits. So ETS encourages innovations to decrease pollution, whereas a rigid standard only encourages a firm to meet the standard, not to go any further. If a firm has the technological ability to efficiently reduce its pollution levels below standard, it can trade by means of EU ETS and make a profit. By being so cost-effective, energy efficiency measures also save money for end users. In terms of reducing the cost of emissions per ton of CO_2, an energy efficiency strategy may even create negative abatement costs, which can be very attractive and profitable to implement (Enkvist, Nauclér, and Rosander 2007). Among a variety of alternatives, energy efficiency shows the highest potential for reducing GHG emissions (Onysko and Mariani 2009). Consequently, several studies are united in the viewpoint that ETS does serve as a GHG reducing method. As Lovins (2005, 74) said "saving fossil fuel is a lot cheaper than buying it."

There may be other viable opportunities adopted by the ETS, such as certifying verifiers—those who verify whether the monitoring plan submitted to accredited authority for participation in the ETS is subject to any mistakes. Kelly (2006) indicates that with huge investments flowing into research in the field of energy efficiency, additional scientific opportunities accompany the launching of the EU ETS. Gagelmann and Hansjürgens (2002) mention that the trading system creates incentives for technological innovation, and, in addition, it addresses competition between the sectors. It is a way to make the country more "green" and to become more attractive for investments in-flow.

Rose and Stevens (1993) examined the efficiency and equity implications of marketable permits for carbon dioxide. Empirical research was based on the non-linear programming model that evaluates costs and benefits before and after permit (allowance) trading. The analysis covered the permit allocations of eight regions (the United States, Western Europe, the Commonwealth of Independent States, Canada, Brazil, Central Africa, Indonesia, and China). The study concluded that the net benefits of marketable permits are positive and the trading order of US$20 billion for eight countries can end up involving transfers of tens of billions of dollars toward developing and transitional economies. Therefore, trading leads to a much more efficient outcome. An obvious conclusion drawn from that research: the issuance of marketable CO_2 allowances is indeed beneficial both financially and in terms of assistance to developing communities.

The trading system also introduces many new activities that include occupations ranging from traders and brokers who specialize in intermediary market activity to consultants who offer services regarding the trading principles. Additional opportunities include providing new legal services for market participants and creating software for market operations. Taken as a whole, these services may provide employment for thousands of people.

Establishing a domestic ETS may also improve the international environmental image of the country by showing a commitment to global challenges and the provision of the global public good, by increasing the future credibility of the country, and by improving international relations.

The Kyoto Protocol proposes a total of three flexible mechanisms that are designed to assist countries in meeting their Kyoto targets: Emissions Trading (ET), the Clean Development Mechanism (CDM), and Joint Implementation (JI). Since April 2004, the EU Parliament made a remarkable step toward linking the EU ETS with these flexible mechanisms of the Kyoto Protocol (Butzengeiger and Michaelowa 2004), when the Directive 2004/101/EC also known as “the Linking Directive” was accepted (Kelly 2006). This positive “moment” is an opportunity for operators of the EU ETS to comply by buying carbon credits generated from CDM or JI projects. These mechanisms are considered supplementary to domestic measures such as switching to low carbon production, energy efficient technologies, and so on (Quinn 2008). Generally, the CDM allows developed and developing countries to enter into agreements for emission reduction (or carbon sequestration) projects in developing countries. The Marrakech Accords developed after the Seventh Conferences of the Parties in Morocco specify details for carbon credits originating from flexible mechanisms. For instance, projects implemented under the CDM can generate transferable carbon credits known as Certified Emission Reductions (CERs). JI, in turn, allows Annex I (developed and industrialized) countries to claim carbon credits, known as Emissions Reduction Units (ERUs), for

investing in emissions reduction projects implemented in other industrialized countries (see UNFCCC n.d. for more information on the flexible mechanisms of the Kyoto Protocol). However, the use of credits through the Kyoto mechanisms is limited and the limit differs across the EU member states. The difference between a domestic emissions trading scheme and the Kyoto mechanism is that, domestically, allowances are distributed to installations, whereas the Kyoto Protocol provides allowances to individual countries or a group of countries such as the EU.

Among other positive traits of an ETS is the possibility of linking a domestic trading system to an international ETS, such as the EU ETS. Roberts and Staples (2007) define the key requirements set by the Kyoto Protocol for eligibility to participate in international emissions trading. A country must be a party to the Kyoto Protocol; it must have established its emissions cap, its national registry, and a national system for the estimation of GHG emissions by sources; and it must have submitted its most recent GHG inventory. Linking is crucial for the interests of both Kazakhstan and the international community, since larger schemes tend to be less volatile than smaller schemes; on the other hand, mobilization of the private sector and market forces can improve the efficiency and cost effectiveness of efforts to reduce GHG emissions in Kazakhstan (Hood 2010). Emissions trading systems also have a higher chance of fostering international climate agreements than do carbon taxes, at least initially (Grubb and Newbery 2008). Linking to international emissions trading is an opportunity for Kazakhstan to turn EU countries' attention toward investing in emissions reducing projects in Kazakhstan with a view to getting carbon credits in turn.

To sum up, the ETS, if run correctly and implemented step-by-step, brings a set of advantages with its use. Emissions trading in the EU has been considered a favorable tool for reducing CO_2 emissions in a cost-efficient way. Environmentally oriented, it is effective in mitigating the harmful effects of global warming (Hill 2006).

The First International and World's Largest Emissions Trading System

The European Commission, after a series of discussions, finally published a draft directive on EU ETS on October 23, 2001 (Gagelmann and Hansjürgens 2002). The EU directive on emissions trading was officially adopted in July 2003. The main content of the directive was shaped through the complicated EU decision-making process (Skjærseth and Wettestad 2009). The trading system was created under Directive 2003/87/EC. In addition, Directive 2003/87/EC was amended to Directive 2009/29/EC as of April 6, 2009, specifying the post-2012 framework of the EU ETS structure, which focuses on climate action and renewable energy (Zeben 2009). The EU ETS applies to all 27-member states of the European Union.

Generally, a cap-and-trade mechanism involves any sites, stations, refineries, or other industrial units that contain installations emitting GHGs, have a specified limit on their emissions, the so-called "cap," and that are allowed to emit GHGs within this cap; otherwise they will have to buy allowances to cover shortages of emission rights through the market of the ETS. In case an installation operating in the ETS can decrease its emissions below the specified cap by upgrading its energy efficiency or switching to low-carbon technologies, then it can sell the extra allowances left to other participants of the market, making a profit on the sale. The system's outcome should be the reduced amount of GHG emissions (Weishaar 2007).

Grubb, Vrolijk, and Brack (1999) outline the possibilities of linking domestic ETS with other systems internationally, including the EU ETS, thus allowing a country to sell its available surplus allowances in other emissions trading systems. As a result, countries would be linked with each other directly or indirectly (by third-party governments) and could buy or sell allowances through a worldwide emissions trading system, thus contributing to the global target of reduction.

In the European Union, the ETS covers almost half (46 percent) of total EU-wide CO_2 emissions (Oberndorfer and Rennings 2007). Directive 67/EU/2003 establishes the framework for and sets out the sectors to which the EU ETS applies. Caps have been distributed to only four sectors so far: the first sector is energy production (combustion installations with a thermal input more than 20MW—except for hazardous or municipal waste installations—mineral oil refineries, and coke ovens); the second sector is the production and processing of ferrous metals; the third is the mineral industry (including production of cement and glass); and the fourth is paper industries (Roberts and Staples 2007).

The pilot phase of the EU ETS took place in the course of two years, from 2005 to 2007, during which information was gathered and the working of the system in practice (as opposed to theory) was analyzed. This first international and largest emissions trading market covered around 11,500 installations across Europe. Experience obtained during the first phase was enough to prepare for the second stage of trading under the Kyoto mechanism, which commenced in 2008. The first trading period served, more than anything else, as a test for the "real" market of the second phase during 2008–2012 (Convery, Ellerman, and De Perthuis 2008). This second and more important phase of the EU ETS also known as the "Kyoto phase" corresponds with the EU's obligations period under the Kyoto Protocol. Additional lessons learned about the emissions trading directive are to be applied in the third and much longer period of the EU ETS, covering the seven years from 2013 to 2020. During the third phase of the ETS, the cap requirements will be more stringent and will raise expected CO_2 equivalent emissions reductions by up to

1.74% per year, with the overall reduction of emissions by 21% relative to the base year 2005 (Frunza 2010).

How does EU ETS work? Roberts and Staples (2007) give a clear overview to that process. An operator of an installation that falls within the trading sectors mentioned above must obtain a GHG emissions allowance from the relevant authority. The allowances, called "EU Allowances" or "EUAs," set maximum CO_2 emissions from the installation for the following calendar year. The installation's emissions have to be verified by an accredited independent company (the verifier) to carry out the verification, which ensures the accuracy of the calculations on the appropriate installations. Data on emissions must be submitted to the regulating authority not later than 31 March, whereas compliance for that installation is evaluated by 30 April. From that point on, operators start trading EUAs to make sure that they can comply. By the end of the preceding year, operators of installations must surrender their allowances, and failure to do that could result in fines. Currently the fine for noncompliance is 100 Euros per ton of CO_2. Noncompliant installations will also have to buy the quantity of allowances they are short of their cap, and surrender these allowances as well (Roberts and Staples 2007).

Allocations in the first phase were distributed for free in accordance with each installation's historic emissions indicator. The second phase, though, applied a so-called auctioning system, which implies that out of the overall allowances required by operators, a major part of the allowances was allocated for free, whereas the rest had to be acquired through auction. However, there is also a reserve volume of allowances for new entrants to the market and for those who enhance installation capacity, thus emitting more. In cases of closure of the installation, all the remaining allowances are auctioned (Hood 2010).

The ETS market is now well established, and allowances are traded over-the-counter and on exchanges such as ECX Europe, Powernext, Nordpool, and others (Roberts and Staples 2007). It is now crucial to study the development of Kazakhstan's emissions trading system, keeping EU ETS as an example to follow and for avoiding any shortcomings. The following section presents an overview of Kazakhstan's ETS.

Legal Framework for Kazakhstan's Domestic Emissions Trading Scheme

The draft law outlines several characteristics of the scheme. The Ministry of Environmental Protection is the assigned regulating authority. The system covers the sectors of industry, oil and gas, energy, chemicals, agriculture, transport, and mining metallurgy.

The national allocation plan (NAP) for the reporting period specifies allocation procedures that include data on total certificates and volume and defines industries and operators to be

allocated. Emission allowances to installations are allocated annually, and the distributed allowances are called "certificates." Carbon certificates are given on the basis of a passport for each installation, which sets emissions limits for compliance. Installations must surrender their allowances until the first of April after the reporting period. In case installations are short of carbon allowances, they can buy allowances available on the market or can generate allowances through project mechanisms. If installations have extra allowances available, they can sell them to other installations operating in the market.

In order to get a certificate, each entity must provide the following set of documents: an inventory report for the reporting period, a passport of installation, and the emissions reduction program, which is a set of implementation measures projected to reduce emissions accepted by the accredited authority. Certificates are allocated to one or, if necessary, several installations of the same operator. In case of changes to the operator's legal details, the authority will issue new certificate(s) if new data is accepted. If the operator is not satisfied by the amount of distributed certificates, it can apply for additional certificates by providing all supporting documents to the authority. All participating operators in the market must submit a monitoring plan that specifies the approach on how to monitor the compliance of the operator.

A registry is dedicated to keeping information on all allocated certificates. The so-called "allowance reserve fund" is defined in the NAP and is reserved for new entrants to the market and for those operators who are increasing their emissions output. (Note that this information was taken from the draft law on establishment of domestic emissions trading scheme.)

The Upper Chamber of the Parliament accepted the draft law on the domestic emissions trading system as of October 6, 2011. Now the draft law is subject to the President's signature. For now, however, it is not clear what the long-term effects of the domestic emissions trading scheme will be. The outcome is still uncertain and unpredictable, and a set of other crucial issues are still to be defined for Kazakhstan's emerging emissions trading scheme. Among them are cap-setting decisions, trading system requirements, noncompliance sanctions, verification principles, market tracking software installation, and allowance allocation. The following are some of the questions that remain to be answered:

- What should be included in the monitoring plan?
- How should emission allowances be allocated in terms of different sectors?
- Who is going to be a verifier during the beginning stage of market operation?
- What are the consequences for noncompliance?

A working group comprising representatives from government, industry, scientific fields, and NGOs is drafting the amendments to the national legislation, thus further developing the domestic emissions trading scheme.

Points of Consideration in Adopting ETS Features in a Domestic Emissions Trading Scheme

Gagelmann and Hansjürgens (2002) address five major aspects that must be tackled in any tradable emissions system:

1. Defining the trading system coverage (that is, who holds the allowances)
2. Defining the level of allowed emissions
3. Setting the mechanisms for allocation of allowances to market participants
4. Ensuring a stable trading environment so that other regulations could not limit active trading incentives
5. Setting up effective ways of monitoring and applying sanctions and fines against noncompliance

Mullins (2005) mentions that implementation of the directive on emissions trading involved several issues, such as producing a guidance report for industries and establishing relevant institutions on monitoring and verification, as well as setting up national allowance registers. All of these are important in the production of the National Allocation Plan (NAP), which specifies cap setting and allowance allocation procedures. In short, NAP serves as the basis of the allocation process.

Skjærseth and Wettestad (2009) address three challenges the EU faced in the development of the EU ETS: (1) acceptance of the idea of emissions trading, (2) a choice of the system design, and (3) its practical application. They relate these challenges to three phases of the EU ETS: policy initiation, decision making, and implementation.

Zeben (2009) importantly concludes that the success of the EU ETS market depends on several market aspects that keep prices stable, enable the market to operate with sufficient demand and supply, and that make the market attractive enough for investments in innovation. All these market mechanisms can either reinforce or undermine each other since any tradable environment price is dependent on a variety of events, such as the sudden release of negative information, which has occurred in the EU. However, efforts must be undertaken to ensure that the long-term goal of the ETS is consistent with its initial goal—the reductions of emissions.

Time management is also relevant for Kazakhstan at preparatory stages of the system, where decision making about features of the system and possibilities of future linking must be taken into account at the same time that paying attention to capacity-building measures such as personnel training and recruitment must be priorities. In Germany, for instance, a working group for emissions trading was established five years prior to the first trading phase. However, the complexity of the system with its allocation rules made it necessary to establish a federal emissions trading office with a staff of from 80 to 110 employees—The German Emissions Trading Authority (DEHSt n.d.).

One problem for Kazakhstan is that the legal basis is still missing. Lack of legal mechanisms that stimulate ETS, allow participation in ETS, and finally, identify a by-stage approach for companies to prepare a monitoring plan, calculate historic allowances, and identify the quantity of installations on the site can seriously narrow boundaries for further discussion of the issue. Building capacity for effective economic and legal mechanisms is critical in order to improve technical expertise, institutional development, and support for monitoring systems and to address the potential for future linking on the international scale.

Lessons Learned from the EU ETS Market Operations

Several problems faced by the EU ETS must be prevented in the development of the system in Kazakhstan.

Overallocation

Engels, Knoll, and Huth (2008) conducted a research survey among companies of four European countries (United Kingdom, Germany, the Netherlands, and Denmark). The questionnaire included a set of valuable questions, some of which were related to whether or not companies had traded at all, and if so whether they acted as sellers and/or buyers. Respondents that did trade were then differentiated according to their selling and/or buying activities. Results showed that the rate of sellers was quite high, which demonstrated that overallocation for the first phase indeed occurred. It is consistent with the findings of Kettner and others (2007) and Egenhofer and Fujiwara (2006) that the EU trading scheme had been overallocated by 4.6% in 2005. Most probably due to the significant overallocation, many companies were reluctant to engage in active emissions trading in the first phase (Engels, Knoll, and Huth 2008). Furthermore, Roberts and Staples (2007) in their analysis of the first phase of the EU ETS mention that operators were allocated more allowances than they required. The result was a sharp fall in price for an EUA to less than one Euro, while at the initial stage it started with high 20s. Overallocation is unfavorable and must be prevented to reduce the price volatility of

allowances, increase the stability and predictability of the system, and prevent windfall profits to businesses, which are transfers of welfare from consumers to businesses.

The qualitative research conducted by Engels, Knoll, and Huth (2008) was based on a questionnaire sent to more than 1,000 companies involved in the EU ETS and clearly shows what to avoid in order to achieve high rates of trading (Figure 2).

Figure 2. Research Outcome of Four EU Countries from Trading on the ETS in the First Phase (2005–2007)

	Germany	UK	Denmark	The Netherlands
Rate of Trading	Low	High	High	High
Use of Auctioning	None	None	5%	None
Reduction Target	21%	12.5%	21%	6%
Distance to Target	-2.1%	+2.4%	19.6%	-6.6%
Allocation	Overallocated	Underallocated	Overallocated	Heat and power sectors were under-allocated, whereas small emitters were overallocated.
Preferred Trading Channels	Directly with other emitters	Traders and brokers	Directly with other emitters and via brokers	Directly with other emitters and via brokers
External Advice Sources	Industrial associations	Consulting firms	Mostly did not use external advice means.	Consulting firms, state services, banks

Source: Author's compilation from the research survey conducted by Engels, Knoll, and Huth (2008).

For instance, the UK, in comparison to other countries, achieved overimplementation of its emissions reduction target by 2.4%. Generally, the UK was underallocated by allowances, signaling that underallocation is better to some extent than overallocation in the ETS.

Therefore the first thing for Kazakhstan to be cautious about is overallocation of allowances, which may distort active market involvement. Prevention of overallocation and "hot air trading" criticism is important for Kazakhstan to prevent negative effects on

consumers, avoid distrust in the emissions trading system, and reinforce the country's credibility as a serious and responsible player in the international community.

Fraud

Frunza, Guégan, and Lassoudiere (2010) in their study showed the quantitative data of the carbon market fraud that occurred within the EU ETS between the end of 2008 and the beginning of 2009. The fraud consisted mainly in cashing out the Value Added Tax (VAT) proceedings from sales of allowances instead of returning it to governments. The empirical evidence estimates the impact of the VAT fraud for the French government on the carbon market to be at 1.7–1.9 billion Euros.

Small Coverage

Even before the first stage of the EU ETS went into force in 2005, in accordance with Gagelmann and Hansjürgens (2002), it was believed that the implementation of an ETS could offer great cost savings opportunities and in fact, the bigger the market, the higher the efficiency gains would be. Furthermore, there was a degree of doubt as to whether small member states would establish an emissions trading system on their own, so it was important to motivate the trading. In this case, the EU arena compared to the Kazakhstani market seems to be more suitable to establishing an ETS. Being the ninth biggest country in the world, Kazakhstan still suffers after the collapse of the Soviet Union in terms of production and industrial processes, which may not provide sufficient depth to the market and a necessary minimum level of trading.

Short-Term Losses from Adaptation

Clearly companies may face short-term costs in adapting to a new system of trading, either from reducing production, switching to less carbon-intensive production, or installing energy saving and efficiency tools. However, such companies could become more competitive in the long-term through reducing production costs by increasing energy efficiency or decreasing fuel demand, especially if fossil fuel prices continue to rise (Hill 2006). In this regard such issues as carbon leakage problems must be addressed.

Environmental Effectiveness and Economic Efficiency

Lastly, Oberndorfer and Rennings (2007) mention that the current principle of the EU ETS has been criticized for its questionable environmental effectiveness and economic efficiency. For instance, national targets by the Kyoto Protocol were not considered sufficiently, thus resulting in inefficient cap settings. A number of studies questioned whether all EU countries would be able to actually achieve their Kyoto targets after the

EU ETS had been started. It is always a risk to do something for the first time. Results of Kazakhstan's ETS are unpredictable and could either be successful or fail. If enough effort by Kazakhstan's government is dedicated to learning from the experience of existing emissions trading systems and to building the country's capacity, it is possible to avoid mistakes made previously. By following these principles, Kazakhstan will be able to establish the system correctly.

Conclusion

Information on the European Union Emissions Trading Scheme and highlights of current initiatives in Kazakhstan to adapt a similar system (with some differences) are presented in this article. The domestic emissions trading scheme is set to be finally adopted in 2013. Its adoption depends on a complex decision-making process with regard to the emissions trading rules. However, some aspects of the draft law on the emissions trading scheme indicate that important steps in that process have already been taken. In this article, the author has tried to provide an overview of the current Kazakhstan draft law specifying characteristics of the domestic emissions trading scheme.

Introduced in this article are different studies that favor an emissions trading system that offers opportunities ranging from reducing emissions to linking to the international carbon market. Development of the system brings multiple benefits to Kazakhstan, including the mitigation of negative effects on the economy from climate change, improvements to the economic, social, and physical well-being of the nation, increases in the energy efficiency of companies, the creation of large incentives for international investment inflows and new work places, and continued improvement of international relations.

In addition, the author also demonstrated crucial points to take into account for the establishment of a domestic emissions trading scheme following the EU's example. One positive aspect of the EU ETS is that it is running in many different countries (and institutional settings), simultaneously facing various issues and providing a vast base for learning from experience. Lessons from the EU ETS show, however, that unexpected events may indeed occur. The first and the main issue to consider is avoidance of an overallocation of allowances, as it can influence the supply and demand of the market and lead to insufficient participation in the system as a whole. Another factor affecting market operation is fraud, which became popular on the EU ETS from the end of 2008. Fraud appeared in various forms, from VAT fraud to hacking accounts of operators and selling existing allowances. Small coverage of the market and short-term market adaptation losses are among other threats that operators of Kazakh installations could face during the first phases of trading.

Work by the Ministry of Environmental Protection of Kazakhstan on emissions trading is continuing and more detailed examination of design options is possible. It is a challenge to establish such a system. It will require the creation of a proper legal basis and capacity building from international cooperation, foreign experience, and adaption to the unique national circumstances of Kazakhstan. The system must be installed step-by-step to minimize adaptation problems of local firms. Factors such as the national welfare, industry development and competitiveness, and regional concerns are critical in designing a domestic emissions trading scheme to ensure its effectiveness and active participation. Progress in submitting quantitative commitments by the country will greatly assist in the development of a domestic emissions trading system specifically targeted at reaching commitments under the Kyoto Protocol.

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Biography

Saltanat Sabitova was born on April 12, 1985, in the small town of Taldykorgan in the south of the Republic of Kazakhstan. She obtained a BSc in Finance from International Academy of Business and BSc in Law from Academy of Economics and Law in Kazakhstan. In 2009 she graduated from the London Metropolitan University with a MSc degree in Finance. She was awarded a Volkswagen scholarship in April 2010, and is using it to conduct joint PhD research at the Justus-Liebig University of Giessen in Germany and at the Kazakh Research Institute for Ecology and Climate in Kazakhstan. Her research contains analysis on the implementation of the Kyoto Protocol and post-Kyoto commitments in Kazakhstan from both the legal and land-use perspectives. It focuses on how appropriate forestation projects in Kazakhstan may influence the implementation of existing voluntary and future commitments under the Kyoto Protocol. In particular, she considers participation in the voluntary carbon markets as well as development of the domestic emissions trading scheme as one of the major factors that can contribute to the effectiveness of state measures on the issue.