An Icelandic Geothermal Cluster:

Is Cross-Border Engagement in Emerging Markets Feasible?

Hilmar Þór Hilmarsson, Professor

University of Akureyri, School of Business and Science, Sólborg, Norðurslóð 2, 600 Akureyri

Hilmar@unak.is

Keywords: Geothermal cluster, Iceland, Cross-border engagement, Funding and risk mitigation instruments.

ABSTRACT

Iceland´s progress in utilizing geothermal energy for space heating and electricity production has received international attention and Iceland already has become a significant player in the global geothermal energy market. During the transformation to geothermal energy know-how has accumulated and a number of companies and institutions now have proven capabilities in, for example, exploration of geothermal sites, drilling as well as in constructing, operating and maintenance of geothermal power plants.

The purpose of this article is to analyse and assess the potential of an Icelandic geothermal exporting cluster engaging internationally. The focus is on cross border activities of an organized exporting cluster engaging in the provision of consultant and advisory services, construction, operators and maintenance of geothermal power plants, as well as sponsors and shareholders in geothermal projects. The objective is to answer the question if it is feasible for an Icelandic geothermal cluster to engage in cross border activities in emerging markets and if so, what type of engagement would be feasible?

The paper concludes that Icelandic companies could possibly benefit from participating in and developing a geothermal exporting cluster to engage in emerging market economies. However, the global economic and financial crisis has severely affected the balance sheets of key Icelandic energy companies. Capital shortages will be difficult to overcome, especially for companies that intend to engage in cross border investments. Cooperation with international financial institutions remains a possibility, but so far Icelandic companies have not been successful in forming partnerships with them and Icelandic membership in IFIs is limited. Icelandic companies, banks and the government are novices in the field of international development cooperation and lack knowledge and experience in doing business with international financial institutions. The stakeholders in an Icelandic geothermal exporting cluster will need to develop a concerted strategy and an action plan if they intend to turn geothermal energy into a truly international opportunity. There is a lack of a formal platform for collaboration and coordination to form an effective exporting cluster that would have the capacity to engage in cross border investments in emerging market economies. An Icelandic geothermal exporting cluster would also require a concerted effort of many different players in Iceland, public as well as private, who engage in consulting, construction, finance, research, education, etc. It will probably take years of organization and coordination before any significant benefits could materialize from an exporting cluster. Currently the possibility to engage in energy investments in emerging markets seems limited. This is due to the limited capacity and experience that Icelandic companies have in forming international consortia. Such cooperation is particularly important to overcome the capital constraint that severely affects many Icelandic firms post crisis. Cooperation with IFIs is also important for proper risk management. The absence of a functioning national export credit agency (ECA) to support trade finance is also an obstacle for Icelandic cross border engagement in this area. In the short term it seems more likely that Icelandic companies can sell geothermal expertise overseas, provide advice and possibly participate as operators, in maintenance or in constructing of geothermal power plants. This is unlikely to generate large revenues in the context of national accounts but it could certainly make a difference for individuals and companies. Private sector cooperation with IFIs in cross border investments could be feasible in some cases but seems unlikely to materialize in the short term.

1. INTRODUCTION

Iceland´s progress in utilizing geothermal energy for space heating and electricity production has received international attention and in fact Iceland has already become a significant player in the global geothermal energy market. During the transformation to geothermal energy know-how has accumulated and a number of companies and institutions now have proven capabilities in, for example, exploring geothermal sites, drilling, constructing, operating and maintaining of geothermal power plants.

In November 2010 a conference in Reykjavík attended by about 900 participants discussed the potential of an Icelandic geothermal cluster to enhance Iceland´s competitiveness and create a new engine of Icelandic economic growth. Among the participants was the leading scholar on clusters, Professor Michael E. Porter at Harvard Business School. Other participants included the President of Iceland, Dr. Ólafur Ragnar Grímsson, as well as the minister of industry and representatives from the private sector (energy and financial sectors). The minister of industry expressed strong interest in and support for an Icelandic geothermal cluster. The president of Iceland made strong statements about Iceland's potential in this area with a primary focus on international or cross border engagement. During this conference the president expressed his confidence in Icelandic firms and experts to export their knowledge and skills to key emerging market economies including China, India and Russia.

Given that Iceland is a small country still recovering from a severe economic and financial crisis, and the potential partner countries are the largest emerging markets in the world, representing almost half of the population of mankind, the president´s vision must be considered ambitious.

The purpose of this article is to analyse and assess the potential of an Icelandic geothermal exporting cluster in engaging internationally. The focus will be on cross border activities of an organized exporting cluster to engage in the provision of consultant and advisory services, in construction, operators and maintenance of geothermal power plants as well as sponsors and shareholders in geothermal projects. These activities can thus both involve cross border trade and investment. The objective is to answer the question if it is feasible for an Icelandic Geothermal cluster to engage in cross border activities and if so, what type of engagement would be feasible?

The article will start by discussing what a cluster is, including some theoretical considerations. This will be followed by a section on the president's ambitions regarding Iceland's potential to engage cross border in the global geothermal market. Some of the views that Michael Porter expressed during the 2010 conference on Iceland´s potential will then be highlighted.[1] Then the article will provide an overview of some potential Icelandic candidates for this endeavour, companies and institutions. It will consider the structure of energy projects and partnerships for cross border engagement. Finally the article will discuss what instruments the international financial institutions offer for funding and risk mitigation of such projects as well as national risk mitigation via export credit agencies. Are those instruments a feasible and viable solution for Icelandic firms wishing to engage in energy investments in emerging markets and when doing so maximizing the rewards and mitigating the risks?

2. DEFINITIONS AND SOME THEORETICAL CONSIDERATIONS

It is well known that economic clusters exist in virtually every industry and in every part of the world. But what exactly is a cluster? According to Professor Michael E. Porter, clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions in a particular field that compete but also cooperate (Ketels, 2010; Ketels and Memedovic, 2008; Porter, 1998, 2000, 2010).

It seems reasonable to assume that society and industry could reap some benefits of reaching critical mass in experience and interactions in one place in a particular field. Theoretically the assertion is that significant advantages accrue to companies from being in proximity to complementary products and service within reach of all the suppliers and partners in the product value chain. The emphasis on location and geographic concentrations though seem to contradict the modern and global thought on the mobility of capital and knowledge. This seems like a paradox in an era of global competition. Here, however, the competitive advantages are gained through interconnected companies and institutions locally and competitiveness is driven by the strength of the cluster, not only the strength of individual companies. According to Czinkota, Ronkainen, Moffett, Marinova and Marinov (2009), cluster theory suggests that competition is altered in at least three ways when clusters form successfully: (i) by increasing the productivity of the companies based in the area; (ii) by driving and supporting the momentum of innovation in the area; and (iii) by stimulating the creation of new companies and new configurations of business in the area.

In this article the focus will be on cross border engagement and the emphasis is thus on exporting clusters. The cluster would export its products and services, and/or investment cross border to compete outside the local area. The demand for the services of a local geothermal cluster in Iceland would inherently be limited by the size of the local market. An exporting cluster could grow far beyond that limit and in the case of the geothermal sector potentially expand to emerging market economies much larger than the Icelandic market is. In this case each industry in the exporting cluster would serve to reinforce the productivity, and therefore international competitiveness, of every industry within the exporting cluster. If successful the cluster could become an important force in increasing exports from Iceland.

[1] A follow up conference on the Icelandic Geothermal Cluster took place in March 2013, but Michael E. Porter did not attend so conference participants did not benefit from hearing his assessment of the current status of the geothermal cluster or future vision.

Should the members of an exporting cluster decide to participate in cross border investments they will be met with a number of challenges. In fact, geothermal power projects suffer from risks not found in other thermal power generation projects including higher up-front development costs associated with uncertainty as to site capacity (Delmon, 2009). Geothermal projects involve greater up-front commitment of capital compared to other thermal power generation and early phase of geothermal development may be highly dependent on private equity financing, government support and/or concessional funding from international donors.[2] While these challenges are important the focus of this article will be more on the challenges of cross border geothermal engagement in emerging markets and capital mobilization for large geothermal investments.

3. THE PRESIDENT OF ICELAND AND CROSS BORDER ENGAGEMENT IN EMERGING CHINA, INDIA, RUSSIA, ETC

During the geothermal conference in Reykjavík on November 1, 2010 titled "Icelandic Geothermal: Turning the Cluster into an engine of renewed Icelandic growth" the president of Iceland, Dr. Ólafur Ragnar Grímsson, made a memorable speech. It is worth quoting some of the statements he made to get a flavour of the ambitious visions expressed. When talking about India the president asked "Is it true that we can achieve enormous success in a relatively short time. I have talked to people in India for many years about geothermal energy," (Grímsson, 2010, p. 1). In his speech he also mentions China and Russia. "We have a window of opportunity for only the next five years or so. If we utilize it, there will be enormous opportunities, because it would take others years or decades to catch up while we keep running. But of course if we stop, they can do the same thing as we are now doing, and perhaps beat us" (Grímsson, 2010, p. 3).

According to the president many countries are waiting for cooperation with Iceland as he says "China, India, East Africa, Central America, Slovakia, Hungary and parts of the United States are now eagerly and actively looking to Iceland and asking themselves the question: How can we cultivate this co-operation?" (Grímsson, 2010, p. 5).

It is clear that the president is talking about cross border engagement with Icelandic involvement – an exporting cluster - but he does little to define exactly what this engagement would involve. Some attempt is made when he says: "We can define our partnerships in many ways. We could obtain a small shareholder stake in these products. We could build what I sometimes call elementary district heating systems in so many Chinese cities that it would be difficult to count them. If we obtain just a tiny percentage of that transformation in China, it would amount to a major economic input into the Icelandic economy" (Grímsson, 2010, p. 5). It is hard to fully understand what exactly this means but being a shareholder would normally require not only providing advice or selling technical expertise but also cross border capital investment.

The president has been optimistic before. What did he say about the Icelandic banking sector prior to the 2008 crisis? In a speech at "The Kaupthing Seminar" in Helsinki in May 2006 the president said "Yes, the future does indeed offer fascinating opportunities – and the growing strength of the Icelandic banking sector will, as before, play a crucial role, both in itself and by providing valuable connections to the international banking community. The three leading Icelandic banks – Kaupthing, Landsbanki and Glitnir – are amongst the fastest growing banks in the world. And the largest of the three, Kaupthing, has already established a pivotal position in Northern European banking. It has been both a privilege and an education for me to follow the growth of their activities and witness the praise that the Icelandic banks have received from their foreign clients – to confirm how the Icelandic banks have become key players in international financing for prominent European and American companies" (Grímsson, 2006, p. 5). About two years later all these banks collapsed.

The failure of the internationalization of the Icelandic banking system does not necessarily mean that the internationalization of the geothermal sector will fail. However, geothermal energy investments are large, capital intensive and long term. There are risks involved here. The government of Iceland has done little to address those risks and is thus behaving just as it did when the banking sector expanded. Risk mitigation strategies for cross border energy investments were not among the issues discussed in any detail during the November 2010 Reykjavík

[2] In fact, the obstacle is the initial test drilling phase for geothermal projects, which is expensive and risky was discussed during a follow up conference in Reykjavík in 2013, titled Iceland Geothermal Conference. During this conference World Bank Managing Director Sri Mulyani Indrawati called on donors, multilateral banks, governments and the private sector to join a Global Geothermal Development Plan (GGDP) to better manage and reduce risks of exploratory drilling to bring what is now a marginal renewable energy source into the mainstream, and deliver power to millions. The Global Geothermal Development Plan's initial target is to mobilize US$500 million (World Bank, 2012 and 2013).

The World Bank Group's financing for geothermal development has increased from $73 million in 2007 to $336 million in 2012, and now represents almost 10 percent of the Bank's total renewable energy lending (World Bank, 2013). This is obviously a very small amount as compared to the global needs but nevertheless shows increased commitment from the World Bank.

geothermal conference although the problem of capital shortages was mentioned as an obstacle for growth.

4. PORTER AND THE GEOTHERMAL CLUSTER AS AN ENGINE OF RENEWED GROWTH

Michael E. Porter, the leading scholar in cluster theory, made a comprehensive presentation during the geothermal conference in Reykjavík on November 1, 2010. While his comments were made shortly after the global economic and financial crisis hit Iceland (in October 2008) many of the same economic obstacles still remain in Iceland, including strict capital controls.

A large follow up geothermal conference took place in Iceland in March 2013 but for some reason Porter did not attend this time.[3] This was unfortunate given that Porter had initiated much of the work in mapping and analysing the Icelandic Geothermal cluster and its future potential. His presence in 2010 undoubtedly helped mobilize a large number of participants for this endeavour in the beginning. The discussion below is based on his 2010 presentation that still remains very relevant for the cluster.

When discussing investment to leverage Icelandic expertise in the geothermal sector, Porter stated that the "lack of capital is a key constraint" (Porter 2010, p. 28). This was not surprising given that Iceland´s major banks had all collapsed after the crisis and many companies in the geothermal sector faced financial difficulties. When commenting on the potential for exporting services Porter observed that Icelandic "Companies tend to lack size and capital to lead large projects" (Porter 2010, p. 28). In addition to this and related to his discussion on operational management Porter correctly comments that "Skills (are) more technical than commercial" (Porter, 2010, p. 28).

These are all important observations. It is true that Icelandic companies tend to be small and even the biggest companies are faced with severe capital constraints, including large companies like Landsvirkjun and Orkuveita Reykjavíkur. It is both doubtful whether these companies could and should try lead large cross border projects in emerging markets or developing countries. They have little experience in this area except when Orkuveita Reykjavíkur, through Reykjavík Energy Invest, tried to do so in Djibouti and failed. Also while Icelandic technical and engineering skills seem strong, financial and commercial expertise necessary for resource mobilization for energy projects seems limited. Knowledge of and skills in applying risk mitigation instruments for capital mobilization in emerging markets, that often have a difficult investment and business climate, are key to success.

Porter also emphasised the need to "Clarify the role of publicly-owned companies in exports" (Porter, 2010, p. 32). This is an important point especially for Landsvirkjun that is in government ownership and Okruveita Reykjavíkur that in owned by municipalities. Why should companies with public ownership take risks from cross border activities and pass the bill to the taxpayer like Orkuveita Reykjavíkur did via Reykjavík Energy Invest when it failed in Djibouti.

Porter also talked about how important it was to "Identify potential international partners" (Porter, 2010, p. 32), to "Address capital shortages" and the "creation of a special financial instrument with government or foreign partners" (Porter, 2010, p. 32). This is especially important for companies coming from a small country that has capital controls, lacks funding and experience in emerging markets and can be vulnerable in dealing with host governments from and emerging countries that are much larger.

In spite of these obstacles Porter expressed strong confidence in the Icelandic Geothermal Cluster, including cross border engagement. He took as an example of Huston Texas that has lost all its oil and gas, but remains the global capital of oil and gas technology in the world. As Porter stated, Huston is now exporting knowledge, skills, technology, capital and project management.

While Porter saw a potential in growing the domestic resource in Iceland, he saw a bigger long run opportunity for the Icelandic Geothermal Cluster in deploying skill, technology and its expertise cross border. According to Porter someday soon Icelandic companies and Icelandic partnerships should be operating geothermal facilities all over the world. And as he stated "We have every opportunity to be one of the globalizers of this business." (Porter, 2010) Porter is thus like the president of Iceland optimistic about the potential in cross border engagement.

5. AN ICELANDIC GEOTHERMAL CLUSTER – SOME POTENTIAL PLAYERS

There are several Icelandic companies and institutions that possess knowledge and experience in utilizing geothermal energy for space heating and electricity production. They could form an Icelandic geothermal exporting cluster where they would not only compete with each other but could also cooperate and potentially enhance each other's international

[3] Sri Mulany Intrawadi, Managing Director, represented the World Bank Group in this conference. In her meeting with the Icelandic Minister for Foreign Affairs the emphasis was not on creating an engine of Icelandic economic growth via cross border engagement in emerging markets in Asia and Europe, but on development assistance to East Africa where Iceland, through the Icelandic International Development Agency, and the World Bank would cooperate and contribute (Ministry for Foreign Affairs, 2013a and 2013b).

competitiveness. Some of those companies and institutions are listed in table 1 below.

Table 1: Some possible participants in an Icelandic geothermal exporting cluster.	
GeoScience	ISOR, Mannvit, Vatnaskil.
Technical Consulting	Mannvit, Verkís, Efla, Reykjavík Geothermal, Landsvirkjun Power, Reykjavík Energy Invest.
Business Consulting	KPMG, Capacent Corporate Finance, Íslandsbanki.
Drilling	Jarðboranir, Ræktunarsamband Flóa og Skeiða.
Construction	ISTAK, ÍAV and Loftorka
Energy Audit & Law Firms	KPMG, Pricewaterhouse Coopers, Deloitte, Lex (law firm), Logos (law firm).
Financing	Arion banki, Íslandsbanki, Landsbankinn.
Geothermal Research	ISOR, Mannvit, Vatnaskil, Utilities, Universities.
Research Funding	Orkusjóður, Geothermal Research Group, Landsvirkjun´s Energy Fund, Orkuveita Reykjavíkur Energy Fund, Rannís.
Training and Education	University of Akureyri , University of Iceland, Reykjavík University, Reykjavík Energy Graduate School of Sustainable Systems, Keilir – Atlantic Center of Excellence, United Nations University – Geothermal Training Programme.

If some of the above players would cooperate in cross border operations they could engage in different activities or a combination of those activities, including as: (i) consultants providing advisory services, (ii) operators of power plants, including maintenance, (iii) contractors for drilling and construction, and (iv) sponsors and shareholders. Activities (i) to (iii) would not necessarily require cross border capital investment but (iv) would. In addition to providing equity capital, sponsors and shareholders would also often need to ensure that loans are available, for example, from investment banks, and provide adequate guarantees for lenders. It is not unusual for energy investments involving the private sector that 70 present of the investment is funded by loans.

Creating an effective exporting cluster can result in opportunities and efficiency gains for the participating companies and enhance their competitiveness. However, there are also institutional challenges involving for example the simultaneous investments in various industries as well as coordination among companies providing goods and services within the cluster. Overseas geothermal energy engagement can provide a global market opportunity for Iceland that could potentially result in stronger economic growth in the coming years. Several Icelandic companies are internationally respected, have highly experienced employees and have developed international networks over the years.

Among the weaknesses within the Icelandic geothermal cluster to engage overseas is limited production of machinery and equipment associated with the utilization of geothermal energy. One wonders if it would be possible to produce machinery and equipment within the cluster like has already happened in the fishing industry. In the fisheries sector, Marel, a company that originated in Iceland, is a major supplier of processing equipment and solutions internationally for the food industry, including in fisheries.

To engage internationally, stakeholders from Iceland will need to develop a concerted strategy and an action plan for engagement. This is complicated, requires strong coordination and simultaneous investments. It is not obvious who will take the lead here and no formal platform for collaboration for overseas engagement currently exists. The government can only have a limited role here. It should avoid picking favoured clusters or companies and get involved in defining priorities in a cluster action plan. It is also doubtful if Icelandic companies in public ownership should be involved here at all.

6. THE STRUCTURE OF ENERGY PROJECTS

It seems clear from the speech of the president of Iceland at geothermal conference in Reykjavík in November 2010 that he is talking about exporting clusters that would be engaged in cross border investments in emerging markets. This can be seen from his speech when he talks about "shareholder stake" (Grímsson, 2010, p. 5).

It is worth noting that the construction and operations of energy sector projects, including geothermal power plants, typically involve many different players: shareholders, grantors of concessions, offtake purchaser, input suppliers, construction contractors, operators, lenders, etc. They also often involve both public and private sector players who then form a public private partnership (PPP), see figure 1. The sharing of the risks and the rewards is a great challenge in such complicated institutional frameworks and efficient risk allocation is key to success.

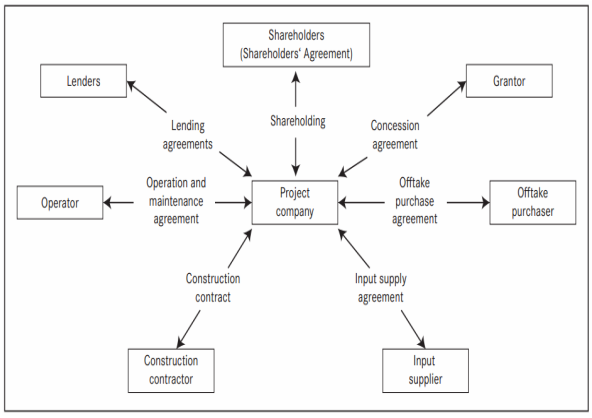

Figure 1. A typical PPP BOT project. Source: Delmon, 2009.

The institutional and financial challenges for companies from small countries that are engaging in such complex and capital intensive cross-border activities, as the energy sector projects typically are, have not been analysed and assessed specifically for exporting clusters. Clusters require a concerted effort on the behalf of many different players, public and private. Such analysis needs to be done properly and in the case of engagement in emerging market economies it may include partnership with partners such as: other shareholders, private investment banks, international financial institutions, export credit agencies and foreign host governments. This represents both an opportunity and also a challenge for Icelandic companies since international financial institutions are now committed to and have plans to increase their engagement and investment in clean energy projects as part of the battle against climate change, see table 4. This also is a challenge because many Icelandic companies suffer from weak financial structures and have limited ability to borrow from investment banks post-crisis and little experience in and limited capacity to work with international financial institutions. Icelandic companies also lack experience in forming consortia that often are necessary for energy investments that tend to be large, capital intensive with long payback periods.

Even the largest energy companies in Iceland, Orkuveita Reykjavíkur and Landsvirkjun, have financial difficulties. The fact that those companies are in public ownership (including municipalities in the case of Orkuveita Reykjavíkur) can make their cooperation with international partners complicated. The government of Iceland needs to clarify what those companies can do and what they cannot do in partnership with international players, both public and private, as well as international organizations. In fact, it is highly questionable if companies owned by municipalities or by the central government should engage in risky overseas investments at all.

7. CAN INTERNATIONAL FINANCIAL INSTITUTIONS SUPPORT CROSS BORDER GEOTHERMAL ENGAGEMENT IN EMERGING MARKETS?

If Icelandic companies that are a part of a geothermal exporting cluster engage in cross border investments in emerging markets, capital shortages will be among key challenges that they will face. How could they possibly solve this problem, and in partnership with whom?

Among the most obvious partners to help solve that problem are international financial institutions (IFIs) that have strong presence in emerging markets and can offer financial instruments, such as, equity, loans, guarantee/insurance instruments, etc., to support investment projects. The involvement of IFIs could also facilitate participation of private international investment banks, (ECAs), as well as potential co-sponsors providing equity capital (for more discussion about the structure of projects support by IFIs see Hilmarsson, 2012).

Among the institutions of the World Bank Group are the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) who work with host governments (requiring government guarantees). The private sector arms of the World Bank Group are the International Finance Corporation (IFC) and the Multilateral Investment Guarantee Agency (MIGA) that support private sector investment (without government guarantees).

There are also IFIs with regional focus including the African Development Bank (AfDB), the Asian Development Bank (AsDB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IDB), etc. The European Union also has an investment bank, the European Investment Bank (EIB).

As table 2 shows IFIs offer funding in the form of loans and equity as well as guarantees and political risk insurances that can help mobilize funding from other sources, including e.g. loans from private sector commercial banks as well as equity participation from private sector companies.

Table 2: International Financial Institutions and Major Financial Products.

Institution	Major Products
Asian Development Bank (AsDB)	Loans, equity, guarantees, advisory services, and syndications.
African Development Bank (AfDB)	Loans, equity, commercial and political risk guarantees, syndications, and technical assistance.
European Bank for Reconstruction and Development (EBRD)	Loans, equity, guarantees, securitized finance, advisory services, and syndications.
European Investment Bank (EIB)	Loans, equity, guarantees, and technical assistance.
Inter-American Development Bank (IDB). Non- sovereign Guaranteed Operations.	Loans, guarantees, grants, technical assistance, and syndications.
International Finance Corporation (IFC) – World Bank Group	Loans, equity, guarantees, securitized finance, advisory services, and syndications.
Multilateral Investment Guarantee Agency (MIGA) – World Bank Group	Political risk insurance guarantees.

Source: International Finance Corporation, 2011.

Capital shortages for cross border energy investments to emerging markets is not only a problem for potential Icelandic investors. This is a global problem. It is widely known that investment needs in clean energy in emerging markets and developing countries are huge. The IFC, for example, estimates that electricity sector investment needs in developing countries from 2007 to 2030 will be US$7.9 trillion

(IFC, 2009). This is about half of the Gross National Income of the U.S.A. in 2009 (World Bank, 2010).

IFIs contribute billions of dollars to private sector investments every year and part of those funds go to clean energy investments, see table 3. However, even if all the IFI funds were used for clean energy investments this would only be sufficient to fund a small fraction of the global investment needs for clean energy. This is why pooling funds from the public, private sectors and the IFIs are necessary.

Table 3: International Financial Institutions and Annual Private Sector Commitments, 2010.

Institution	Annual Private Sector Commitments, 2010
Asian Development Bank (AsDB)	$4.3 billion in support of private sector development, of which $1.9 billion was approved for direct assistance to private sector companies and projects.
African Development Bank (AfDB)	$1.9 billion (fiscal year ending December 31, 2010).
European Bank for Reconstruction and Development (EBRD)	$8.9 billion (fiscal year ending December 31, 2010).
European Investment Bank (EIB)	€3.69 billion (fiscal year ending December 31, 2010) outside the European Union.
Inter-American Development Bank (IDB). Non sovereign Guaranteed Operations.	$1.2 billion (calendar year 2010).
International Finance Corporation (IFC) – World Bank Group	$12.7 billion (fiscal year ending June 30, 2010) for own account, plus $5.4 billion of mobilization.
Multilateral Investment Guarantee Agency (MIGA) – World Bank Group	$2.1 billion (fiscal year ending June 30, 2010).

Source: International Finance Corporation, 2011.

The international community increasingly emphasizes clean energy investments for environmental reasons and as part of the battle against climate change. To promote those investments the international community uses the international financial institutions.

Table 4 shows that there is a clear focus on clean and renewable energy, and climate actions among most IFIs. Some institutions (AfDB, and IFC and MIGA of the World Bank Group) do not mention this specifically but presumably those kind of investments would fall under infrastructure investments that they as well as all the other IFIs mention as key private sector focus areas.

Table 4: International Financial Institutions and Key Private Sector Focus Areas.

Institution	Key Private Sector Focus Areas
Asian Development Bank (AsDB)	*Infrastructure*, capital markets, and financial sectors, **with an increasing focus on clean and renewable energy**, frontier markets, and underserved economies.
African Development Bank (AfDB)	*Infrastructure*, financial sector, industries, agribusiness, services, regional integration, and inclusive growth.
European Bank for Reconstruction and Development (EBRD)	Industry, commerce and agribusiness, natural resources, **renewable energies**, *infrastructure*, financial institutions, and SMEs.
European Investment Bank (EIB)	*Infrastructure*, **energy, climate action,** financial markets, SMEs, microfinance, and industry.
Inter-American Development Bank (IDB). Nonsovereign Guaranteed Operations.	*Infrastructure*, **energy,** transport, water and sanitation, industries, agribusiness, natural resources, financial institutions, capital markets, trade finance, health care, education, tourism, corporate governance, corporate social responsibility, and **climate change.**
International Finance Corporation (IFC) – World Bank Group	Frontier markets and IDA countries, sustainability, *infrastructure*, agribusiness, health and education, financial markets, and SMEs.
Multilateral Investment Guarantee Agency (MIGA) – World Bank Group	IDA and conflict-affected countries, *infrastructure*, and South-South investment projects.

Source: International Finance Corporation, 2011.

Partnership with private investors has for a long time been a central part of IFI support to the private sector. Most IFIs limit their participation in a project investment to well under 50 present, thus requiring partnership with other investors. The structure of IFI finance substantially leverages the capital provided by governments. Not only do IFIs borrow significantly from outside to support their operations, but they also invest alongside private financiers and sponsors in projects. Indicatively, the net result is that one dollar of capital supplied to an IFI by governments can lead to $12 of private sector project investment (IFC, 2011).

The Nam Theun 2 Project in Lao is an excellent example of a successful leveraging of a multilateral guarantee mechanisms in a difficult business and investment environment. The risk mitigation instruments used by the World Bank Group were IDA PRG and MIGA PRI. The Asian Development Bank (AsDB) also provided a guarantee (for more detail see World Bank, 2005; Hilmarsson, 2012).

If Icelandic companies sponsor a geothermal project in an emerging market, or maybe more likely, form a consortium with investors from other countries to sponsor a project, an IFI such as the World Bank would be an ideal partner to help mobilize funds.

Guarantees to facilitate the participation of private investors could be important here. However, Icelandic companies have so far not been successful in working with the IFIs that Iceland is member of i.e. the World Bank Group and the European Bank for Reconstruction and Development (EBRD). In fact, Icelandic companies, banks and the government are novices in the field of international development cooperation and lack knowledge and experience in doing business with international financial institutions. Furthermore, unlike the other Nordic countries, Iceland is not a member of the regional development banks, i.e. the Asian Development Bank (AsDB), the Inter-American Development Bank (IDB) and the African Development Bank (AfDB).

IFIs generally need to demonstrate that their financing is essential, beyond what commercial finance would provide on its own, and that they can add value through risk mitigation and improved project design that leads to better overall development outcomes. They need to ensure that they crowd in investment and do not harm development of private financial markets. Most IFIs recognize this need, and many call their special role "additionality," that is, the value they bring to a project beyond what private sector financial institutions could typically offer (IFC, 2011).

All the IFIs are large and carry out extensive feasibility studies before they move on with a project. They are bureaucratic and project approvals take time. It is doubtful that these long processing times fit well with Icelandic mentality. The president of Iceland described this well when he was praising the Icelandic banks that shortly after his speech collapsed. When talking about the Icelandic approach the president said "On numerous occasions I have also emphasized how Icelandic society, including our history and traditions, has produced a modern business culture that has proven to be very favourable when meeting the competitive challenges of our times" (Grímsson, 2006, p. 3). And then the president goes on to describe some of those qualities of the modern Icelandic business culture and talks about "The inclination to focus on results rather than a process: to go straight to the task and do the job in the shortest time possible" (Grímsson, 2006, p. 4). This would not fit well with the long preparation time often used by international financial institutions. The president goes on to say "The absence of bureaucracy and our lack of tolerance for bureaucratic methods. Perhaps because there are so few of us, we have never really been able to afford extensive bureaucratic structures" (Grímsson, 2006, p. 4). This approach proved to be extraordinarily expensive for Iceland in the case of the banking sector that eventually failed. If Icelandic investors want to gain the trust of international financial institutions and other reliable partners, this behaviour must change. They need to learn.

IFI participation can help projects in emerging markets in two ways: (1) making them more commercially viable through, for example, better finance, improved risk mitigation, advice; and (2) improving their developmental outcomes by, for example, providing the advice and standard setting that lead to better operations, products, and services; stronger environmental, social, and corporate governance activities; or projects that are more inclusive (IFC, 2011). IFIs also tend to provide finance with longer maturities, which is generally beyond the risk appetite of private capital (IFC, 2011).

8. THE ROLE OF EXPORT CREDIT AGENCIES IN SUPPORTING CROSS BORDER TRADE

In most developed countries there are export credit agencies (ECAs) that have been established by the countries to help finance export of their national goods and services as well as to support cross border investments. The inherent risks in cross border trade, especially to emerging markets, and the importance of global trade have made states supported guarantees and finance, where there is lack of private sector capacity, necessary. Almost all OECD countries have national ECAs. ECAs can provide guarantees in connection with projects where there are deliveries of equipment and/or services to the project from the home country.

ECAs can provide guarantees both against commercial and non-commercial risks in emerging markets and these instruments can be quite suitable to support overseas energy investments in developing countries and emerging markets. Within Nýsköpunarsjóður atvinnulífsins such an instrument exists and is called Tryggingardeild útflutnings (TRÚ). TRÚ was intended to work in partnership with the Swedish export credit agency EKN which would assist the Icelandic agency to assess risks in host countries. According to Icelandic law TRÚ can provide guarantees and insurances up to 130 million SDR.

To make the story short TRÚ services have never been used by Icelandic exporters or cross border investors. In contrast the demand for the services of ECAs has sharply increased in other countries especially during the crisis that started in the fall 2008 (Dinh and Hilmarsson, 2012).

As with the international financial institutions, Icelandic exporters and investors are not using the risk mitigation instruments that have been available. Nevertheless, it seems obvious that an Icelandic ECA could be very useful to support trade finance to cross border projects where Icelandic companies would be involved as providers of equipment and services. In the case of the Nam Theun 2 project mentioned above, the Swedish EKF, the Norwegian GIEK and the French Coface, all provided trade finance support that was critical for the success of the project (World Bank, 2005).

9. CONCLUSIONS

Icelandic companies could possibly benefit from participating in and developing a geothermal exporting cluster to engage in emerging market economies.

Iceland has made an impressive transition from fossil fuel to clean energy and has a high share of geothermal energy in its overall energy use. Many Icelandic geothermal companies and institutions have considerable experience in geothermal activities and exporting Iceland's know-how and experience could increase export revenues. However, the global economic and financial crisis has severely affected the balance sheets of key Icelandic energy companies.

Capital shortages will be difficult to overcome, especially for companies that intend to engage in cross border investments. Cooperation with international financial institutions remains a possibility but so far Icelandic companies have not been successful in forming partnerships with them and Icelandic membership in IFIs is limited. In fact, Icelandic companies, banks and the government are novices in the field of international development cooperation and lack knowledge and experience in doing business with international financial institutions. It is doubtful that energy companies in public ownership should engage in cross border projects in emerging markets.

The stakeholders in an Icelandic geothermal exporting cluster will need to develop a concerted strategy and an action plan if they intend to turn geothermal energy into a truly international opportunity. There is a lack of a formal platform for collaboration and coordination to form an effective exporting cluster that would have the capacity to engage in cross border investments in emerging market economies. An Icelandic geothermal exporting cluster would also require a concerted effort of many different players in Iceland, public as well as private, who engage in consulting, construction, finance, research, education, etc.

It will probably take years of organization and coordination before any significant benefits could materialize from an exporting cluster. Currently the possibility to engage in energy investments in emerging markets seems limited. This is due to the limited capacity and experience that Icelandic companies have in forming international consortia and in cooperating with international financial institutions (IFIs) that Iceland is a member of. Such cooperation is particularly important to overcome the capital constraint that will severely affect many Icelandic firms post crisis. Cooperation with IFIs is also important for proper risk management. The government of Iceland has neglected its relationship with IFIs and can provide little support or guidance on how to proceed. The absence of a functioning national export credit agency is also an obstacle for Icelandic cross border trade in this area.

In the short term it seems more likely that Icelandic companies could sell geothermal expertise overseas, provide advice and possibly participate as operators, in maintenance or in constructing of geothermal power plants. This is unlikely to generate large revenues in the context of national accounts but it could certainly make a difference for individuals and companies most of which remain small. Private sector cooperation with IFIs in cross border investments could be feasible in some cases but seems unlikely to materialize in the short term.

REFERENCES

Czinkota, M., Ronkainen I., Moffett M., Marinova S. and Marinov, M. (2009). International Business European Edition. England: John Wiley & Sons, Ltd.

Delmon, J. (2009). Private sector investment in infrastructure. Project finance, PPP projects and risk (2nd ed.). Netherlands: Kluwer Law International.

Dinh T. Q. and Hilmarsson H. Þ. (2012). Private Sector Export to Emerging Market Economies During Times of Crisis: How Can Export Credit Agencies Help? *Review of International Comparative Management*, Volume 13, Issue 1, March 2012, p. 167-180. Retrieved March 8, 2013 from http://www.rmci.ase.ro/no13vol1/18.pdf

Grímsson, Ó. R. (2006). Icelandic ventures: Can the success continue? A speech made at the Kaupthing Seminar in Helsinki on May 24, 2010. Retrieved August 16, 2012, from

http://forseti.is/media/files/06.05.24.Helsinki.Conference.pdf

Grímsson, Ó. R. (2010). Iceland Geothermal 2010. A speech made in Reykjavík on November 1 during a conference titled: Iceland geothermal 2010. Retrieved August 16, 2012 from http://forseti.is/media/PDF/2010_11_01_Iceland_Geothermal.pdf

Hilmarsson, H. Þ. (2012). Small States and Large Private Sector Investments in Infrastructure in Emerging Market Economies in Partnership with International Financial Institutions. In Innovation Systems in Small Catching-Up Economies: New Perspectives on Practice and Policy. Springer Book Series on Innovation, Technology and Knowledge Management, Volume 15, Part 2, 139-158. Retrieved August 16, 2012, from http://link.springer.com/chapter/10.1007/978-1-4614-1548-0_8

International Financial Corporation, IFC. (2009). Financing of Renewable Energy: IFC's Perspective. Presentation made in Washington D.C. in November 2009. Washington: World Bank.

International Financial Corporation, IFC. (2011). International Finance Institutions and Development Through the Private Sector. Retrieved January 19, 2013 from http://www.developmentandtheprivatesector.org/report/files/assets/downloads/IFI_and_Development_Trough_the_Private_Sector.pdf

Ketels, C. and Memedovic, O. (2008). From clusters to cluster-based economic development.

International Journal of Technological Learning, Innovation and Development, 1,(3), 375-392.

Ketels, C. (2010). Profile of the Icelandic Geothermal Cluster. Presentation made at Icelandic Geothermal 2010. Conference in Reykjavík on November 1, 2010.

Ministry for Foreign Affairs. (2013a). Utanríkisráðherra fundar um jarðhita með framkvæmdastjóra Alþjóðabankans. Retrieved March 14, 2013 from

http://www.utanrikisraduneyti.is/frettir/nr/7579

Ministry for Foreign Affairs. (2013b). Foreign Minister and World Bank Managing Director discuss geothermal issues. Retrieved March 14, 2013, from

http://www.mfa.is/news-and-publications/nr/7581

Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*. November-December 1998.

Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, 14(1), 15-34.

Porter, M. E. (2010). The Icelandic Geothermal Cluster: Enhancing Competitiveness and Creating a new Engine of Icelandic Growth. Presentation made at Icelandic Geothermal 2010. Conference in Reykjavík on November 1, 2010.

World Bank. (2005). Project finance and guarantees: IDA guarantee paves renewed interest in private hydropower: Nam Theun 2 project. Retrieved January 20, 2013 from http://siteresources.worldbank.org/INTGUARANTEES/Resources/Lao_NamTheun2_Note.pdf

World Bank. (2010). World Development Indicators Database. Retrieved June 16, 2011, from http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNI.pdf

World Bank. (2012). Global Geothermal Development Plan. PowerPoint presentation. Retrieved March 15, 2013 from http://www.esmap.org/sites/esmap.org/files/ESMAP_Paris_Geothermal_Energy_KEF_Optimized.pdf

World Bank. (2013). World Bank Calls for Global Initiative to Scale Up Geothermal Energy in Developing Countries. Retrieved March 14, 2013 from

http://www.worldbank.org/en/news/press-release/2013/03/06/world-bank-calls-global-initiative-scale-up-geothermal-energy-developing-countries

Acknowledgements

The author would like to thank the University of Akureyri Research Fund for supporting the research underlying this paper.