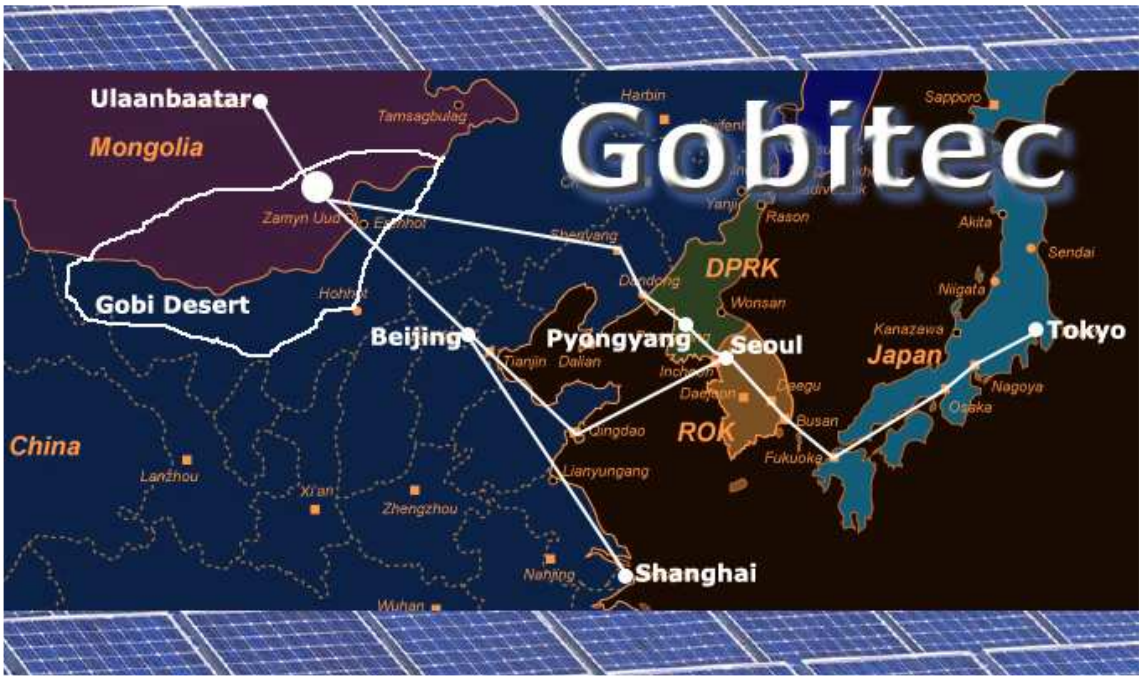
Tackling climate change, increasing energy security, engaging North Korea and moving forward Northeast Asian integration – "Green Growth" in Korea and the Gobitec project



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1. Introduction – Green Growth in Korea

From 2008, the government of Lee Myung-Bak in South Korea used the slogan of "green growth" as a tool to market its economic policy: elected on a platform of better economic results than its predecessor, the Lee administration had to cope with the fallout from the global crisis, which hit Korea strongly due to its export orientation. To put "green" in front of "growth" was not only a marketing gag (though it certainly helped selling the policy, also abroad), but it was also based on the recognition that this sector was for a number of reasons – among them the lack of own raw material and energy resources, international pressure in climate policy and a possible decline of traditional export sectors – better to act proactively to achieve a "greening" of industry and policies. Also, upgrading the national image is an important factor in this policy – having comparable levels (of certain environment-related measures) than advanced economies is a frequent argument for green policies. Though remarkable differences exist to European approaches – for example, nuclear energy remains a cornerstone of the energy concept, which will be increasingly important and some large-scale development projects hardly qualify as green, like the 4-river-project – nevertheless an effort is made, also expressed in funds, to increase the importance of "green" issues – from eco-tourism to green energy, from green urban renewal to transportation policy.

Energy policy is a particular problem for Korea. Having no own energy resources but being the 10th largest consumer of energy worldwide, Korea urgently needs to diversify its sources of energy. Currently, 97 percent of energy are imported. While nuclear energy has an increasing share in producing electricity, energy diplomacy with regards to oil and gas was the main tool for diversifying supply sources, e.g. with Russia and Vietnam. Renewable energies played a minor role in this concept. But their share is increasing, as well as the participation of industry in developing and producing sites and equipment for renewable energy production.

The challenges of a global financial and economic crisis in conjunction with the doomsday scenarios of climate change often seem to put insurmountable problems to society and politics. However, crises always work also as catalysts for new and innovative solutions. In Europe, the vision of inexhaustible clean energy seems suddenly to be within reach and the word "Desertec" fuels the dreams of industrialists and environmentalists alike: clean energy on a sustainable, non-exhaustible basis. Can Northeast Asia live up to the challenge and implement a similar strategy? This paper in the second part reviews the energy policy mix of South Korea. The third part looks into the European desertec model. Section four discusses the possible advantages of a Northeast Asian "Gobitec" approach, followed by a conclusion (5.).

2. The future development of the South Korean energy mix and the solar energy sector

In September 2008 the Ministry of Knowledge Economy announced the strategy of the new government for energy policy, based on a plan by the National Energy Committe, which will radically alter the production and use of energy in Korea (Ministry of Knowledge Economy, 2008). The goals of Korea`s energy policy are the improvement of energy efficiency and reduction of energy consumption, the increased supply of clean energy and reduction of the use of fossil fuels, the boosting of green energy industry, all this while maintaining affordable energy for the citizens. In the first field the ambitious goal is the increase of energy efficiency (measured as energy use per 1000 US-$ of production) by 46 percent. Among the measures to

increase energy efficiency is government support for R&D in the field, the introduction of market mechanisms, e.g. in emissions trading and the determination of energy prices, the improvement of public transportation and the development of a fuel-efficient car manufacturing industry producing "green cars" on a large scale. Also, urban renewal projects based on green energy and zero-energy, carbon-neutral buildings are part of the plan. The consumption of fossil fuels, according to the plan of the Energy Committee, should be moderately reduced until 2030 from 83 percent of total energy consumption to 61 percent, while combined renewable energies would increase their share from 2.4 percent in 2007 to 11 percent in 2030. The remaining share will come from nuclear energy with 27.8 percent, compared to 14.9 percent today. More than ten new nuclear reactors are now planned for this purpose.

Relatively the highest is the jump of the share of renewable energies, though their total contribution will remain only one-tenth of the total in the projection for 2030. But this means a 37-fold increase for wind power, a 19-fold increase for biofuels, a 44-fold increase for photovoltaic energy and a 51-fold increase for geothermal power. This should be partly achieved through the introduction of renewable energy in public buildings, partly by a renewable portfolio standard for companies. In particular, core technologies in photovoltaic energy (like thin-film solar cells) and wind energy (like large wind turbines) will be developed with state funding. To support green energy industry, the government promises to investment 11.5 trillion won (about 11 bn. US-$) up to 2030 for R&D, and hopes that this effort creates about 950.000 jobs in the green industry. The photovoltaic industry is a young industry in Korea. In 2004, a feed-in tariff system has been introduced and until 2008, 350 MW of capacity of photovoltaic cells have been deployed. In 2007, the share was 81 MW alone and in 2009 the share is expected to increase to 98 MW, with a forecast of a further increase to 132 MW in 2010 and 160 MW in 2011. Currently, large companies like LG, Hyundai and Samsung enter the PV market or value chain.

Solar thermal power, as utilized in the Desertec project, is rather a new and unexplored field in South Korea's energy mix, though in particular the Korea Institute of Energy Research explores applications as low temperature solar energy systems, zero energy solar houses, as well as solar thermal power generation (see the overview of Kang 2006).

Energy diplomacy remains part of energy policy, but now it also reaches out to renewable energy and green industries. In 2009-2012, Korea plans to spend 1.7 tr. KRW (1.45 bn. US-$) for green industry promotion in developing countries (Korea Herald 2009). While the share of renewable energy in the long-term project remains small, the dynamic effects of green energy development cannot complete be predicted today. It can be expected that more research and wider use will lead to (maybe dramatically) falling costs and higher efficiency. For solar cells this phenomenon already can be observed. But is there a way to increase the share of renewable more visibly? The European answer to this question will be discussed in the next section.

3. Importing solar energy from the Sahara desert – the Desertec project

The idea of Desertec is to generate clean and inexhaustible energy in the Sahara desert and bring it through a sophisticated energy grid not only to adjacent regions of the MENA (Mediterranean and North African) or Maghreb region, but also to the industrial

centers of Europe. The technology for this – solar thermal power generation - is already known and used on a small-scale: mirrors bundle the sunlight in desert areas and create steam (like in a traditional coal-fuelled steam electricity power station). Energy can be saved at daytime and released in peak-times or night-time. It will be transported to Europe by a grid of 20 power lines. A feasibility study calculates that the establishment of a network of 50 solar energy power stations and a grid producing nad transporting 100 Gigawatt of energy until 2050 would cover 17 percent of European demand for electricity and would cost 400 bn. Euro. Solar power stations would use 2500 sqkm of desert ground and 3500 sqkm for the power grid. This land use of 6000 sqkm over the whole of the Maghreb compares in size to the artificial Nasser lake and dam system in Assuan in Egypt, producing less than three Gigawatt of energy, while the solar stations would produce 100 Gigawatt. The energy is clean, inexhaustible and can be handled; in California the technology is tested since 20 years, without greater problems, for example in terms of damage from natural disasters like sandstorms or taifuns, than for other forms of energy production (technical information taken from Deutsches Zentrum für Luft- und Raumfahrt 2009).

The idea of using this technology on a large-scale to find a broad answer to global problems, different from the much less significant small-scale sources of renewable energy, came first up in discussions in the Club of Rome's TREC programme on clean energy. A Desertec Foundation (www.desertec.org) was founded and on July 13, 2009, an MoU on a consortium Desertec Industrial Initiative was signed by 12 companies from Europe, mainly from Germany, including heavyweights like Siemens, Deutsche Bank, ABB and Munich Re, to bring the concept to the market (Desertec Industrial Initiative 2009). By the end of October 2009 they set up a limited liability company with seat in Munich responsible for the project (Bayerische Staatskanzlei, Press release no. 519). The initiative found a tremendous interest in the economic sections of newspapers as well as among environmental stakeholders. The congregation of industrial heavyweights, also including large German energy producers like RWE or EON showed the determination and the clear belief that the project can be realized. Environmentalists are divided in their reaction: While the project would solve problems on a large scale and while side effects are to the moment not known (for example, new grid technology prevents electromagnetic radiation, efficiency losses from transmission also over long distance are reasonable etc.), some environmentalists argue that such a solution would counter the development of small-scale decentralized solutions (like solar cells on each house or small-scale windmills). However, energy production in deserts is much more efficient (according to a study for example the use of a solar energy station in North Africa is 200 times more efficient than the production of energy plants in Europe with the same land use). The opposition against large-scale energy production seems to follow a rather romantic ideal of small-size, as it can be witnessed in Europe also with regards to ecological farming, for example, and not any concern founded in the technology per se.

The Desertec project still faces formidable hurdles, among them the need to raise the substantial initial capital, the necessity for stable demand (like long-term guarantees to buy the generated electricity by European states), questions of security and stability in the Maghreb region etc. However, these obstacles are not insurmountable and, in fact, while not solving all problems of the European energy mix, the addition of a new energy option decreases the risks of being dependent on certain, particular fossil, sources of energy.

4. „Gobitec" – an alternative for tackling climate change, energy security and cooperation for Korea and Northeast Asia

For Northeast Asia, the Desertec approach offers a fascinating model to be applied and applicable to the region: Here, the demand for a stable energy mix are even more pronounced, in particular in Korea and Japan, here, the geographical situation is similar – the region is adjacent to the Chinese-Mongolian desert regions – and the political situation, though not easy, it at least not more problematic than that in the MENA region. In fact, the idea of a similar project, here labeled "*Gobitec*" (alluding to the Gobi desert in Mongolia) could at the same time contribute to three important policy goals in Northeast Asia: it could contribute to tackling climate change by reducing dependency on fossil fuel, it could become a catalyst for policy cooperation and finally political integration by the creation of a Northeast Asian Energy Community, and finally it could increase energy security, by increasing energy choices and decreasing dependency on monopoly suppliers in Russia and the Middle East.

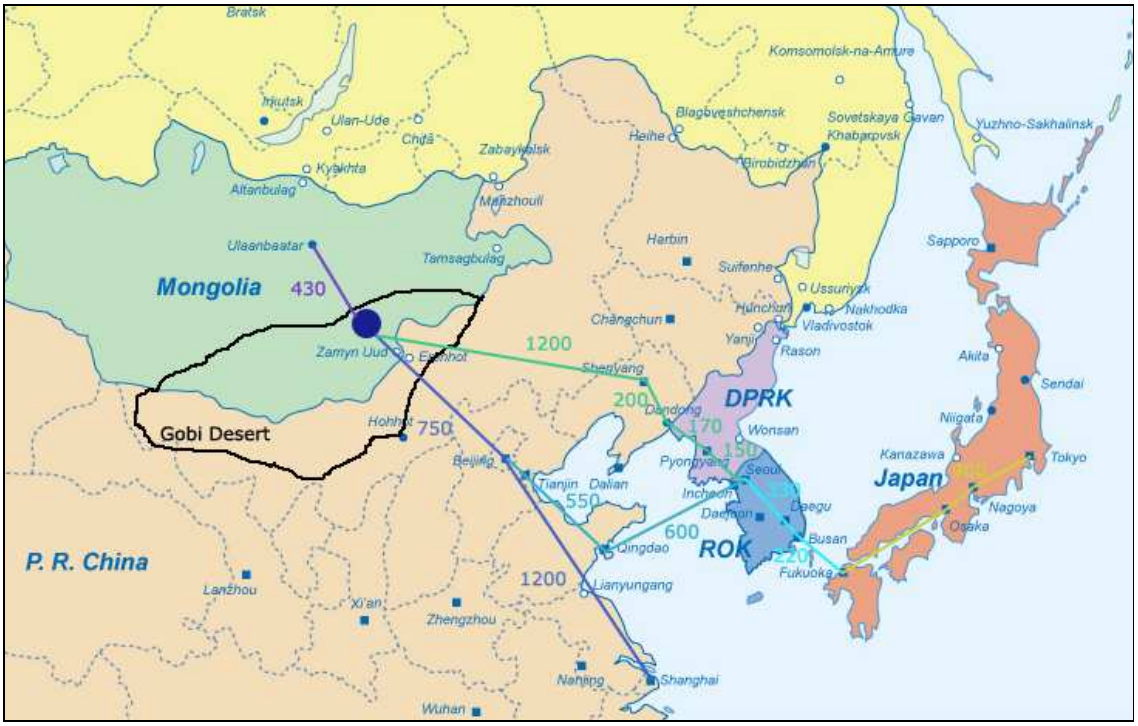
First of all, demand for electricity is high and growing, and – though nuclear energy plays a more important role than in Europe and in particular Germany, where it is phased out – it has its own unresolved problems of coping with nuclear waste, which is in Korea for example as contested than in Germany. So, nuclear energy will not resolve the problem of the Korean and Japanese lack of resources, besides that it is itself an exhaustible energy. The large centers of economic growth in the region, Beijing (and maybe even Shanghai), Seoul, Busan, Osaka and Tokyo are an axis of ever-increasing energy-demand. For Mongolia, the prospect to host such an energy project, would offer new avenues for economic development. At the same time, the Northeast Asian countries in the last years saw a surge of consciousness regarding the environmental challenges of climate change and vow action on it. Green growth, however, needs clean technologies and the Gobitec project would offer exactly that: a green solution on a large scale, not ending, but fuelling further (green) growth.

Second, energy cooperation in Northeast Asia could become a nucleus and a catalyst for further policy cooperation, and in the end even political integration. The search for economic and political integration in Northeast Asia, long restricted by systemic conflict with China and later by ideological differences, in particular with regard to Japan's role in World War II, could gain momentum again. Currently, de facto integration of business, through cross-country investment, like Japanese and Korean investment in China, is already high. Institutional integration, like in a free trade area, is debated, but could not yet overcome political suspicion about Japan. Currently, the political situation is more conducive than ever for Northeast Asian integration: China needs the continued engagement of Japan and Korea, Korea's new administration is pragmatically dealing with international relations, and the end of the decade-long LDP dominance in Japan offers a unique of opportunity to finally overcome the irritations of Japan's neighbours and a reassurance on its peaceful purposes. For Mongolia, being part of such a project would offer the opportunity of integrating from the periphery to the mainstream of Northeast Asian development. In this situation an energy community as a nucleus of a potential larger economic and political integration area, seems more feasible than ever. Already in the past energy cooperation has been proposed as a natural field of cooperation, given the complimentary interests of the Northeast Asian states. Today, with the prospects of huge payoffs from a clean source of energy, this is true more than ever. In such a community there would also be a clear initial division of labour: Korea and Japan, maybe with international technology transfer from the Desertec project or with domestically developed technology, would be technological leaders and would provide the capital necessary. China and Mongolia would provide land, labour and, in particular in the

case of China, political support and protection from possible threats like terrorism.

While this project is not a project of political over economic interest, the potential implications for the region should not be underestimated. Not only could enhanced cooperation between China, Japan and Korea improve the political environment for a solution regarding the Korean Peninsula, but also it could create the opportunity to include North Korea directly into this project. The energy grid could well pass through North Korea, touching and serving Pyongyang as well as Gaesong Industrial Complex and by that two of the potential growth poles of the impoverished country. At the same time – and this distinguishes the Gobitec project from previous proposals of energy cooperation – a maritime alternative to the landline in the grid is technically feasible and would prevent the net from being hijacked for political purposes. As such, Gobitec would offer a unique opportunity of inclusion for North Korea, but it is no way dependent on this offer.

Last, but not least, the Gobitec project would offer an increased level of energy security for participating countries. Like in Europe, electricity provided by the project would not completely substitute, but rather complement (though, depending on the planning to an important extent) the existing sources of energy. By this, not the current oligopolistic structure of supply would be substituted by a new one (one new giant supplier country, Mongolia, with the opportunity to extort money due to its pivotal role), but rather a network of new supply sources, owned partly by companies in the countries of demand. Currently, Japan and Korea, but increasingly also China, try to develop national renewable energy sources. Gobitec would allow them to realize the environmental and strategic goals of these endeavours much more reliable and, in the end, cheaper.



Map 1: Gobitec proposed network in Northeast Asia
(map provided by Judith Halbach, HSS Korea)

As map 1 shows, Gobitec energy grid would comprise the following routes:

Gobi desert – Ulanbataar:	430 km
Gobi desert – Beijing:	750 km
Gobi desert – Shenyang:	1200 km
Beijing – Shanghai:	1200 km
Beijing – Quingdao:	550 km
Quingdao – Seoul:	600 km
Shenyang – Dandong:	200 km
Dandong – Pyongyang:	150 km
Pyongyang – Seoul:	150 km
Seoul – Busan:	330 km
Busan – Fukuoka:	120 km
Fukuoka – Tokyo:	900 km
Total length of the grid:	**6580 km**

Certainly, the total length of the grid has not to be put in place to begin with the project. And, routes to Shanghai, to Seoul via Quingdao and the Yellow Sea and through North Korea are complementary. This is important with view to the political pivotal role, North Korea played in other Northeast Asian energy security schemes.

5. Conclusion – which way forward for Gobitec?

The sketch of the Gobitec project above would allow Korea to increase strongly the share of renewable energy in its energy mix, while at the same time diversifying geographically energy sources and promoting Northeast Asian integration, with an attractive additional offer to make to North Korea. However, the realization of the project depends on a strong political will and decisive leadership to do so. In particular, since Korea is a logical, but not exclusive partner in the project, it will depend on Korea´s first-mover strategy if it can secure a place as the leader in the project.

Desertec fully realized that its solution is applicable worldwide. Currently, in Asia the development of a China-Australia-network is under discussion. However, Northeast Asia is left out of these considerations and it is urgent for the governments and industries of Northeast Asian countries, China, Japan, South Korea, Mongolia, and maybe even North Korea, to take up the challenge of the use of this large inexhaustible source of energy, the sun, and not being left out in the cold of rising fossil fuel prices. A feasibility study and the formation of government-level and industry-level working parties and consortia should be the first steps to take on this challenge. Then, the vision of green growth, which in Korea has recently so much debated, could really become more than a buzzword: reality.

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