

Norwegian Actors in the Fields of Energy and Climate Change in China

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Abstract

Written for and funded by the Norwegian Ministry of Foreign Affairs and StatoilHydro, this report is a descriptive inventory of Norwegian involvement and Sino-Norwegian cooperation in the fields of energy and climate change-related issues in China. Part 1 is a brief, general introduction to the relevant topics, providing both typical and atypical examples of Norwegian involvement and cooperation and partnerships between actors from the two countries. Many valuable cooperative relationships in science and business have been established. The report also comments on areas in which Norwegian involvement is falling behind the other Nordic countries. Parts 2, 3 and 4 consist of lists of the relevant Norwegian governmental bodies, research institutions and private businesses including descriptions of their partnerships, projects and expertise.

Key Words

China, Norway, energy efficiency, renewable energy, fossil fuels, technology transfer, CDM, clean development mechanism, FDI, foreign direct investments

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Abbreviations

BCCR	Bjerknes Center for Climate Research
CAS	Chinese Academy of Sciences
CASS	Chinese Academy of Social Sciences
CDM	Clean Development Mechanism
CEC	China Enterprise Confederation
CER	Certified Emissions Reduction
CICERO	Center for International Climate and Environmental Research
CIENS	Center for Interdisciplinary Environmental and Social Research
CNOOC	China National Offshore Oil Company
DSM	Demand-side management
EIA	Environmental Impact Assessment
EEIA	Environmental and Economic Impact Assessment
ENSI	Energy Savings International AS
EPB	Environmental Protection Bureau
EPP	Efficiency Power Plant
FNI	Fridtjof Nansen Institute
F.Y.P.	Five-Year Plan
GHG	Greenhouse gas
GSN	GreenStream Network
IFC	International Finance Corporation
IN	Innovation Norway
IN-Beijing	Innovation Norway in Beijing
MFA	Ministry of Foreign Affairs
MOST	Ministry of Science and Technology
MW	Megawatt

NCCC	Norwegian Chinese Chamber of Commerce
NEEC	Norwegian Energy and Environment Consortium
NERSC	Nansen Environmental and Remote Sensing Center
NGO	Non-governmental organization
NHO	Confederation of Norwegian Enterprise
NILU	Norwegian Institute for Air Research
NIVA	Norwegian Institute for Water Research
NOK	Norwegian kroner
NORAD	Norwegian Agency for Development Cooperation
NVE	Norwegian Water Resources and Energy Directory
NZC	Nansen-Zhu International Research Center
OED	Ministry of Petroleum and Energy
REEEP	Renewable Energy & Energy Efficiency Partnership
RMB	Renminbi, the Chinese currency
SEPA	State Environmental Protection Agency
SINCIERE	Sino-Norwegian Center for Interdisciplinary Environmental Research
Sinopec	China Petroleum & Chemical Corporation
SFT	Norwegian Pollution Control Authority
UiB	University of Bergen
UiO	University of Oslo
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Program

1 Overview

In 2007, the Norwegian government launched its new China strategy as a response to recent decades' economic and social development in China (Ministry of Foreign Affairs 2007). The new role the country is consequently playing in the world community and the growing economic and geopolitical importance of the East-Asian region are factors which present both challenges and opportunities for Norway. One of the strategy's priority areas is a 'development that is sustainable at the local, regional and global level[s]' (p. 18). China's massive industrial expansion, however, is largely fuelled by coal and oil, renewable energy sources making up only 8% of the energy mix (World Watch Institute 2007). China's demand for oil influences the global energy market, and as prices go up, so does the country's coal consumption, compensating for the expensive oil. In addition, even though its *per capita* emissions remain well below world average, China may have surpassed the United States as the world's top greenhouse gas (GHG) emitter in 2007 (Adam & Vidal 2007). With its immense growth, however, Chinese *per capita* emissions are expected to reach industrialized country average by 2030 (IEA 2007). These notions clearly demonstrate China's position as a key actor in the global climate and environmental regime. Due to the country's size and scope, its current energy consumption as well as future investment decisions made in the energy industry will influence the global environment on all levels in general, and the global climate in particular. Existing energy production facilities therefore need updating and investment decisions need to be based on sound knowledge of energy efficiency and environmental technology. These are fields in which Norwegian actors have skills and experience.

This report is a descriptive inventory of the current Norwegian involvement in the fields of energy and climate change-related issues in China, presenting relevant actors, their projects and business operations. Norway's presence is not big in China, but it is growing. The actors present include governmental agencies, research institutions and private and state-owned companies. In this first section, general trends and illustrative examples are introduced briefly. Sections 2, 3 and 4 contain listings of relevant actors, projects and partnerships belonging to governmental agencies, academia and businesses enterprises, respectively.

1.1 Governmental Agencies

The three Norwegian Ministries of Foreign Affairs, Environment, and Oil and Energy are all active in fields related to energy and climate change issues in China, mostly through funding and international partnerships. Part of the China strategy is for Norway to assist Chinese environmental technical capacity building and to promote energy efficiency and use of renewable energy sources (MFA 2007). It is emphasized that it is also in Norway's own interest to provide such assistance. The Renewable Energy and Energy Efficiency Partnership (REEEP), is one way in which Norway is seeking to meet this goal. REEEP is a partnership whose goal it is to accelerate the global market for sustainable energy developing

sustainable energy systems and by acting as an enabler, multiplier and catalyst for change (REEEP 2007). Norway's contribution consists of 30 million Norwegian kroner (NOK) over a period of three years, funds which are currently contributing to twenty-one projects. While nine of them take place in China and elsewhere, six are China-specific.

1.2 Science and Academia

In this field, what we see is that on the one hand, Norwegian actors do research in China on their own and that, on the other, scientific institutions and individual scientists from the two countries are involved in cooperative research partnerships. The research institutes presented here include important policy-informers such as CICERO, ECON, the University of Oslo's Center for Interdisciplinary Environmental and Social Research (CIENS) and more. These are actors that have spent years establishing relationships with Chinese counterparts such as the Chinese Academy of Sciences (CAS) and the Chinese Academy of Social Sciences (CASS). CAS and CASS are important national academies belonging to the Chinese State Council, the chief administrative authority of the People's Republic. In 2006, CIENS established the Sino-Norwegian Center for Interdisciplinary Environmental Research (SINCIERE), which is a cooperation with CAS and even has an office on the CAS campus. The Nansen-Zhu International Research Center (NZC) is another notable example of Sino-Norwegian cooperation. Also at CAS, NZC is a joint venture between the Nansen Environmental and Remote Sensing Center (NERSC), CAS and others. Yet another example, the consultancy ECON has entered into an agreement on cooperation on energy and environmental issues with the Counselor's Office to the Chinese State Council.¹ ECON will function as a think-tank for the Office on issues of energy, climate and environment, a position with real potential to influence outcomes. Smaller cooperations also exist, with researcher from the two countries joining forces on research projects and contributing to each other's articles and books. Norwegian actors also increasingly hold expertise crucial to these relationships, such as knowledge of Chinese language and culture.

They may seem abundant, but the existence of such cross-border, cross-cultural Sino-Norwegian relationships must not be taken for granted. Unlike twenty or as little as ten years ago, it is now increasingly obvious that the Chinese do not in any significant way *need* Norwegian funding in order to realize their projects. Rather, many admit that they are now in a position to pick and choose; indeed, quite a few of them have far too much to do already. It has become a matter of quality as well as quantity, because the financial aspects may not be the most crucial part anymore. This means that in order to continue the work that already exists as well as expand and develop it further, cooperation needs to be based both on good relationships and on project proposals being attractive to the Chinese.

¹ www.econ.no/modules/module_123/proxy.asp?I=2021&C=9&D=2&mnusel=a185a190a192a248a

1.3 Norwegian Business Actors

China's energy consumption has tripled since 1979. The goal of the 11th Five-Year Plan (F.Y.P.) (2006-2010) is for the economy to be four times as big in 2020, while energy consumption is 'only' going to double in size. This notion involves significant necessary achievements in energy efficiency. The Chinese government often cites its right to an economic and social development for the country's citizens similar to that of the industrialized countries. This means that it is unlikely that it is going to let the climate change threat and other issues of environmental degradation hamper its industrial progress. The 'greening' of China will therefore have to happen in a different way. Ways in which the situation can be improved include energy efficiency, the expansion of renewable energy consumption and cleaner use of fossil fuels. China's energy efficiency rates are improving, but there is still quite some way to go and a lot of potential. Norway, on the other hand, is a country with expertise in this field and several Norwegian companies have already started eyeing these business opportunities in China. To this end, the Norwegian Energy and Environment Consortium (nec) has established an energy management program. The program aims to utilize knowledge and experience in this area as a springboard for Norwegian energy efficiency products and services in the Chinese market.² From its involvement in such projects and cooperation with a range of Norwegian companies, involving two business groups representing 70 companies, nec is a key actor in the field, demonstrating the importance of cooperation. Such coalitions also help solve problems many Norwegian companies suffer from. Their small size and the fact that they seldom offer total business solutions can be problematic, since this is what many Chinese customers and business partners want (personal communication, Skaiaa).

With China's soaring need for energy to fuel its industry, the country can benefit greatly from energy efficient foreign technology. Due to its size, China is now among the global leaders in *renewable energy*, second only to Germany, even though, as mentioned, renewables make up a small portion of the energy mix. The share of renewables in the energy mix is, however, expected to rise from 8% of energy and 17% of electricity today, to 15 and 21% respectively by 2020. The targets of the 11th F.Y.P. together with the Renewable Energy Law of 2005 make continued expansion of renewables a national priority. Power companies are required to get a minimum of their power from renewable energy sources. Renewable energy is also a field in which Norway has extensive expertise.

There does not seem to be any Norwegian involvement in the *hydro-power* industry in China. This is regrettable, since small-scale hydro-

² www.innovasjon Norge.no/Satsinger/Sektorsatsinger/Energi-og-Miljo/Nyheter/NEECs-Energy-Management-program-in-China-taking-shape/

power projects are a hot topic in China and they can become CDM projects. CDM, short for the Kyoto Protocol's Clean Development Mechanism, is a way in which industrialized country GHG emitters can invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions at home. Since Norwegians are present in the production of several other energy sources, both fossil fuels and renewables, the absence in hydropower is notable. For example, Norwegian investors have investments in Chinese *wind energy* and are aiming towards becoming CDM projects. The fastest growing power generation technology in China, wind power doubled its capacity in 2006 (World Watch Institute 2007). It is still more expensive than coal power, but policies exist to encourage competitive pressure on costs. Chinese law demands that 70% of the wind turbines used in power plants financed by foreign operatives be produced in China. This means that such an investment may also boost and benefit domestic wind technology industry and technology development, having important regional and local trickle-down effects. The Norwegian involvement includes a 500 million NOK projects owned by NBT AS scheduled to begin construction in 2008, while yet another investment is being planned. NBT is making preparation to make the wind park a CDM project.

Another alternative energy source, Norwegian involvement in the *biomass* field includes Sanhe Green and the GreenStream Network's 50 megawatt (MW) straw-fired combined heat and power plant which uses local agriculture waste as raw material. The project addresses the Chinese government's target for biomass power generation by exploiting the opportunities generated by the Renewable Energy Law and biomass therefore receives more attractive support than other renewable energy sources (Berstad 2007). This project is also in the process of becoming a CDM project. Thus far, however, Norway is in no way a significant actor in the field of CDM compared to its Nordic neighbors and other European countries (Heggelund & Sun forthcoming). It is the Norwegian government's view that rich countries should help finance emission reductions in developing countries and there is a growing interest in CDM projects among Norwegian companies. Actors in the field are calling out for a focused approach including training and awareness-raising, letting the relevant actors know about the possibilities and risks that exist. China is currently the country with the greatest number of CDM projects in the world, with certified emissions reductions (CER) credits issued every month.³

Turning to *fossil fuels*, Norwegian businesses as well as research and development actors are active in the *liquefied natural gas* (LNG) industry in China. Development of LNG resources and infrastructure for import is currently high on the Chinese energy development agenda, increasingly seen as one of the fuels for the future. This reflects the ability of LNG to compete directly on a cost basis, in addition to the growing recognition of its environmentally benign characteristics. SINTEF cooperates with a Beijing company on LNG pipeline insulation, a cooperation said to have

³ 1067 CDM projects as per January 16th 2008 (<http://cdm.ccchina.gov.cn/english/>).

helped shorten the development period of LNG transportation pipes by several years. This project thus covers both energy provision, energy efficiency and technology transfer. Another interesting example of the importance of technology and technology developments in the fossil fuels sector, the state-owned Norwegian company Statoil a decade ago invested in what was believed to be a marginal oil field in the South China Sea (personal communication, Nørstebø). In stead of the usual 49% maximum foreign ownership, Statoil got 75%, because the investment was believed to be unjustifiable. Ten years down the road, Statoil technology has made it possible to operate the oil field for twice as long as expected, perhaps preventing other marginal fields from being sworn off as unjustifiable investments, thus contributing to Chinese energy security. An example of a Norwegian actor indirectly involved in the Chinese fossil fuels industry, Det Norske Veritas (DNV) has recently won a contract with China Petroleum & Chemical Group (Sinopec) on safety and environment risk assessment software. Sinopec being among the state-owned national oil companies, this is hopefully an illustration of China's growing commitment to addressing the environmental and climate change challenges facing the oil, gas and process industries.

1.4 Summary

This short introduction has provided a few examples of Norwegian involvement in the fields of energy and climate change-related issues in China. As we have seen, many good research and business relationships have been established with Chinese counterparts, cooperative relationships that will no doubt be of value in the future.

2 Governmental Agency Actors

2.1 Ministry of Foreign Affairs – MFA

The MFA is responsible for the upholding, funding and implementation of a range of agreements, partnerships and projects which relevant here.

Agreement: Framework Agreement on Cooperation and Dialogue on Climate Change between Norway and China

In January 2008, Norwegian Minister of Foreign Affairs Jonas Gahr Støre and Vice-Chairman of the NDRC Xie Zhenhua signed a Sino-Norwegian climate change cooperation framework agreement. This agreement will give the two countries a platform for closer cooperation on climate change and cover these key climate change-related areas:

- Energy efficiency and renewable energy
- Climate change mitigation and adaptation
- CDM;
- Carbon capture and storage;
- Capacity building;
- Scientific cooperation, in particular to review and develop ongoing climate science collaboration between the two countries, and joint research on climate friendly technologies;
- Technology transfer, with a focus on climate friendly technologies (MFA – NDRC Framework agreement text, 2008).

In Norway, work will be coordinated by the MFA while other relevant ministries will be actively involved and responsible for providing scientific input.⁴ The MFA has emphasized that the parties consider the involvement of Norwegian business and research communities important.

Implementing agencies: NDRC, MFA/Norad.

Partnership: Renewable Energy and Energy Efficiency Partnership – REEEP

The Norwegian Government is committed to donating 30 million NOK (app. US\$5.51 million) to REEEP over a period of three years. REEEP is an international alliance of governments, non-governmental organizations and businesses and its donors include Ireland, Italy, New Zealand, Norway and the United Kingdom (UK). The donated money will be used to increase the use of clean energy in poor countries. It focuses on reducing carbon emissions, improving energy security and ensuring access to clean energy. It has clear linkages with Norway's action plan

⁴ www.regjeringen.no/en/dep/ud/Press-Contacts/News/2008/climate_china.html?id=498281

for environment in development. Apart from China, it is also particularly active in Brazil, India and South Africa. Only the projects related to China are listed below.

REEEP project: National Action Plan for rural biomass renewable energy development. The purpose of this project is to develop a National Action Plan for rural biomass based energy with supporting documentation (REEEP 2007). Parts of the activities and output include an evaluation of current policy, institutional, technological and financing mechanism on rural biomass renewable energy as well as identifying barriers and priorities for such development in China. Detailed objectives and targets are to become parts of the 11th and 12th F.Y.P. which guide Chinese economic and social development. The project is expected to provide detailed measures to enable China to achieve its biomass development target and GHG emissions reductions.

Category: policy and regulation.

Duration: 2007-2008.

Budget: €250 000 from Norway in addition to co-funding from the Asian Development Bank (ADB) and the Chinese Ministry of Agriculture.

Implementing agency: Energy and Environmental Development Consulting Ltd.

REEEP project: Using financial and market-based mechanism to improve building energy efficiency. Given the significant potential for building energy efficiency improvement in China, this project will consider the appropriate financial and market-based mechanism to trigger action in this area (REEEP 2007). Main activities and output include developing a roadmap for improvement of building energy efficiency in China through the use of financial and market-based mechanisms based on existing mechanism in China and experiences from other developing and transitioning countries. In addition to increased understanding and awareness of the topic, a policy framework to create a favorable environment for implementation of market-based instruments for energy efficiency in building is expected.

Category: business and finance.

Duration: 2008.

Budget: €90 300 from Norway in addition to co-funding from ESD-Sinosphere Ltd.

Implementing agency: Energy for Sustainable Development Ltd. and the Energy Research Institute of the NDRC.

REEEP project: Standardized financial and legal documentation for RETScreen. The RETScreen International Clean Energy Project Analysis Software is a so-called 'decision support' tool that provides basic

financial viability of renewable energy and energy efficiency projects.⁵ The purpose of this global project (including China) is to reduce the pre-construction and legal transaction costs for clean energy projects by establishing a standardized financial and legal document knowledge management system integrated with the RETScreen software (REEEP 2007). Its main activities and outputs include linking existing legal documents for energy efficiency, cogeneration and renewable energy projects to RETScreen Software as well as develop pilot programs in China, India and Brazil. The project aims at reducing pre-construction transaction costs for energy efficiency, cogeneration and renewable energy projects; reducing development costs through an integrated set of freely available form leading to a greater number of projects being implemented.

Category: business and finance.

Duration: 2007-2009.

Budget: €600 000 from Norway and the UK, in addition to co-funding from Natural Resources Canada.

Implementing agency: CANMET Energy technology Centre-Varenes.

REEEP project: Establish a Gold Standard local experts program. This global project aims to build local expert capacity in clean energy project finance and development in Brazil, China, India and South Africa as well as to realize eight renewable energy and efficiency Gold Standard CDM Project Design Documents with financial plans (REEEP 2007). Its main activities and output include recruiting, educating and briefing experts in the target countries; provide local expert support; develop finance and project development toolkits in the relevant languages, and more. The projects expected impacts include providing local support for utilizing the CDM Gold Standard to implement energy efficiency and renewable energy in the target countries; ensure that CDM projects reap benefits for local communities and contribute to the achievement of the millennium development goals; target countries with a rapid demand for energy services and promote projects that forward social, environmental and economic goals.

Category: business finance.

Duration: 2007-2008.

Budget: €125 000 from Norway and the UK in addition to co-funding from The Gold Standard Foundation.

Implementing agency: The Gold Standard Foundation.

REEEP project: London-Beijing Olympic Games CDM Project. This project aims to develop and promote a sustainable CDM cooperation program in China between the Beijing (2008) and London (2012) Olympics which both offsets the emissions from 2012 Games and creates a self supporting infrastructure to facilitate the development of additional

⁵ www.reeep.org/index.php?id=1&assetType=article&assetId=30

similar activities in China (REEEP 2007). Its main activities and output will include the development of a plan for program implementation, including identifying suitable projects. In addition, the implementation of the planned projects will include training and scaling up the identified local NGOs; developing a revolving financing facility or other appropriate structure; developing necessary documentation to support the loans and the transfer and sale of the carbon credits; and developing the CDM documentation and application to the CDM Executive Board. The high profile of the Olympic Games is believed to provide a global platform for raising awareness of climate change. The project is also expected to lead to the development of renewable energy projects and financing facilities in China.

Category: business and finance.

Duration: 2007-2012 including set-up and implementation.

Budget: €350 000 from Norway and the UK in addition to co-funding from London 2012 Partners/Stakeholders, London Organizing Committee of the Olympic and Paralympic Games.

Implementing agency: London Organizing Committee of the Olympic and Paralympic Games.

REEEP project: Energy-Millennium Development Goal Financing Facility Participatory Business Planning. The project, which will take place in Brazil, China and India, aims to reduce poverty by facilitating the ownership of financially, environmentally and socially sustainable business ventures by poor people, utilizing renewable energy sources and energy efficiency provided services and infrastructures (REEEP 2007). It aims to expand the number of participating entrepreneurs in the models developed by the existing MOSAICO partners (a network developing venture capital financing for small and medium-sized projects in renewable energy, energy efficiency, ecotourism and organic agriculture).⁶

Category: business and finance.

Duration: 2007-2008.

Budget: €200 000 from Norway and the UK in addition to co-funding from the Global Energy Efficiency and Renewable Energy Fund and Banca Etica.

Implementing agency: Fiorello H. Laguardia Foundation.

REEEP project: Efficiency Power Plant implementation in Jiangsu Province. This project aims to help the Jiangsu Economic and Trade Commission and its Demand-side Management (DSM) Center in the strengthening of its DSM Efficiency Power Plan (EPP) Program (REEEP 2007). Main activities and outputs include preparing a DSM implementa-

⁶ www.mosaiconetwork.org/where/cn.shtml

tion manual; co-ordinate DSM monitoring and verification protocol; conduct research on appropriate DSM fund management mechanisms for China; organize training for Chinese experts and utility officials on DSM incentive mechanisms, program planning and design, project screening and selection, implementation, monitoring and verification as well as energy service company integration. Expected impacts from the project include greater electricity and carbon savings for Jiangsu Province through paving the way for EPP program implementation; reduce China's total coal consumption through meeting 8% of Jiangsu's energy demand; helping Jiangsu become a national model for successful EPP program planning and implementation.

Category: policy and regulation.

Duration: 2007-2008.

Budget: €374 413 from Norway and the UK, in addition to co-funding from the Energy Foundation's China Sustainable Energy Program (CSEP) and Natural Resources Defense Council.

Implementing agency: Institute for Market Transformation.

REEEP project: Pilot action towards a sustainable energy city in Panzhihua. The purpose of this project is the development of an innovative toolkit with the Panzhihua Sustainable Energy City (SEC) and to improve the city's capacity for clean energy policy and market development (REEEP 2007). Its main activities and output include activities related to the implementation of Panzhihua SEC, such as investigation of its clean energy status quo; training of local stakeholders; development of action plans; summarize and disseminate experiences and more. Among the project's expected impacts we find the mainstreaming of sustainable energy plans into city planning system; ensuring energy supply, environment improvement and economic development by promoting sustainable energy; acting as a showcase for illustrating that local participation is an effective and optimal approach to achieving clean energy; and dissemination of the methodologies and toolkit mentioned above.

Category: policy and regulation.

Duration: 2007-2009.

Budget: €263 800 from Norway and the UK with co-funding from ACPA21 and the Panzhihua Government.

Implementing agency: Administrative Center for Panzhihua's Agenda 21.

REEEP project: Business model development for biogas electric power generation in livestock farms. This project aims to develop a business model to design, finance, build, integrate and operate large-scale biogas facilities at livestock farms in China through market channels (REEEP 2007). The project involves a feasibility study on setting up energy service companies for biogas-to-power including surveying and identifying candidate companies with the capacity and willingness to engage in the biogas-to-power business. The possibilities of project financing through CDM will also be looked into. After the business model has been

developed, an energy service company will be developed to demonstrate the business model. Expected impacts from the business model development include methods to overcoming the barriers of digester construction in the animal husbandry sector, which include heavy reliance on government funds, unreasonable technology options, poor management capacity and low capacity in gaining money for sustainable development.

Category: business and finance.

Duration: 2007-2009.

Budget: €112 200 from Norway and the UK with co-funding from the Blue Moon Fund.

Implementing agency: Tsinghua University.

Project: Raising Awareness on Climate Change Among Chinese Youth

This is a competition happening as a cooperation between the MFA on the one hand and the Chinese Ministry of Education and the Chinese State Ocean Administration on the other.⁷ The Polar Research Institute of China and the Consulate General of Norway in Shanghai are responsible for organization and implementation. Chinese students aged 18-20 can enter a national competition on Arctic knowledge which will end in a finale screened on national television, something which is sure to bring attention to the topic. The prize for the 10 best contenders is a study and research trip to Norway and Svalbard in February and March 2008, including visits to the Polar Museum in Tromsø as well as the University Centre at Svalbard.

2.2 Ministry of Petroleum and Energy – OED

The OED's main areas of responsibility include carbon capture and storage, energy and petroleum research, energy in Norway, oil and gas power and consumers, state participation in the petroleum sector and water resources.⁸

Agreement: Cooperation in Energy Conservation and Renewable Energy between OED and NDRC

This agreement was signed in 2006 and covers cooperation in the fields of energy and energy efficiency (OED 2006). It is the result of many years of dialogue on these topics between Norway and China, especially on hydropower and water resource management. Apart from the environmental benefits of assisting China in these areas, the agreement is also meant to stimulate internationalization of Norwegian knowledge within these fields. The agreement opens up for information exchange and consultation on energy policy, strategy, technology, projects and training.

⁷ www.norway.cn/shanghai/events/Svalbard.htm

⁸ www.regjeringen.no/nb/dep/oed/tema.html?id=752

2.3 Ministry of the Environment – ME

The ME's Department for International Cooperation's areas of responsibility include development of instruments and policy with respect to climate change and long-range transport of air pollutants, as well as international negotiations in these two areas.⁹ Its tasks include following up global environmental cooperation in the UN framework and bilateral environmental cooperation with developing countries, among them China. The ME's section for geographical environmental assistance is the coordinating body for building environmental competence in cooperating countries, such as China, with an aim to develop institutional cooperation with focus on implementing multilateral environmental agreements and the UN Millennium Development Goals.¹⁰ For REEEP see MFA (above).

Funding: Campaign for Environmental Awareness in China

In cooperation with the United Nations Development Program (UNDP), National Geographic, the European Union, the Chinese State Environmental Protection Agency (SEPA), the World Wildlife Fund for Nature in China, China Daily, the Beijing 2008 Olympic Games committee, the ME supports SEPA's Center for Environmental Education and Communications. The campaign's total funding is US\$4.5 million, of which the ME contributes 3 million NOK.

Duration: 2006-2008.

Implementing agency: UNDP.

2.4 Norwegian Agency for Development Cooperation – NORAD

NORAD is a state directorate under the MFA.¹¹ Its most important task is to contribute in the international cooperation to fight poverty. It provides funding for several projects relevant here, some listed under the headings of their owner institutions.

Funding: China Utility-Based Energy Efficiency Finance Program – CHUEE

CHUEE is a program established by the International Finance Corporation (IFC), part of the World Bank.¹² Its goal is to reduce emissions of GHGs in the delivery of energy services by organizing and providing marketing, engineering, project development and equipment financing services to commercial, industrial, institutional and multi-family resi-

⁹ www.regjeringen.no/en/dep/md/About-the-Ministry/Organisation/Departments/Department-for-International-Cooperation.html?id=1203

¹⁰ www.regjeringen.no/en/dep/md/About-the-Ministry/Organisation/Departments/Department-for-International-Cooperation/Section-for-Geographical-Environmental-Assistance.html?id=85655

¹¹ www.norad.no/default.asp?V_ITEM_ID=1139&V_LANG_ID=0

¹² www.ifc.org/chuee

dential sector energy users to directly support implementation of energy efficiency projects (NORAD/IFC CHUEE II agreement text 2008). An agreement was signed by NORAD/MFA and the IFC in January 2008 stating that NORAD is to provide financial support for the second phase of CHUEE (CHUEE II) in the amount of 16.5 million NOK (app. US\$3 million). www.ifv.org/chuee

Duration: 2008-2012.

Implementing agency: Private Enterprise Partnership for China

2.5 Norwegian Pollution Control Authority – SFT

SFT is a directorate under the Norwegian Ministry of the Environment.¹³ Its areas of activity include air pollution, climate change and ozone, environmental information, environmental monitoring on the Norwegian continental shelf, environmental technology, hazardous chemicals, noise, oil and chemical pollution, waste, water pollution. www.sft.no

Project: Environmental Cooperation on China and South East Asia

SFT, together with IN and the Norwegian Research Council (NRC), is focusing on environmental technology in China and South East Asia.¹⁴ In 2007 they suggested a 27 million NOK per year grant to continue the development of a base for Norwegian environmental technology in China and South East Asia. The aim of this initiative is to support the creation of value and knowledge that can have positive effects on environmental degradation in the region as well as globally. One goal is to introduce the Chinese to Norwegian environmental technology, consultancy services and expertise. There would be a special emphasis on research and on small and medium enterprises and the initiative thus encompasses the activities of both academia, private businesses and investors.

Funding: NRC, IN, MFA/NORAD.

Cooperative partners: ME, Ministry of Trade and Industry, MFA/NORAD, Ministry of Science and Technology (MOST), SEPA, SINCIERE, CIENS, SINTEF, Bioforsk, NTNU, Norwegian University of Life Sciences, the Confederation of Norwegian Enterprise (NHO), private consultancies, Norwegian private companies.

Project: Environmental Management in Zunyi

SFT supports environmental management capacity building in the city of Zunyi, Guizhou Province, one of China's 50 most polluted cities.¹⁵ The goal of the project is to strengthen environmental management and routines for inspection and control of the local environmental govern-

¹³ www.sft.no/sok____36560.aspx?query=China

¹⁴ www.sft.no/nyheter/dokumenter/miljoteknologi_plan_2007.pdf

¹⁵ www.sft.no/artikkel____30530.aspx

ment. The project is believed to lead to repercussions also beyond those of the city of Zunyi.

Chinese cooperative partner: Zunyi city Environmental Protection Bureau (EPB)

Duration: 2004 – 2008.

Funding: 7 million NOK from MFA/NORAD.

3 Research Institutes and Coordinating Instances

3.1 Bjerknes Centre for Climate Research – BCCR

Focusing on the natural science aspects of climate change, BCCR is the largest climate research centre in the Nordic countries.¹⁶ It is a leading international centre for research on high-latitude climate change and a key knowledge-provider on climate change to policy-makers, industry and the general public. The BCCR researchers come from a range of disciplinary backgrounds such as meteorology, oceanography, geology, and mathematics, ensuring its multi-disciplinary approach. BCCR is one of the owners of the Nansen-Zhu International Research Centre (NZC) listed below.

3.2 Center for International Climate and Environmental Research – CICERO

CICERO aims to provide reliable and comprehensive knowledge about all aspects of the climate change problem.¹⁷ Its research activities in China are primarily related GHG mitigation. CICERO identifies four policy areas of particular interest if the climate change issue is to be given the needed priority in developing countries: sustainable economic growth and energy security, urban air pollution, regional air pollution and rural development (personal communication, Mestl). CICERO's projects examine, for example, how climate policy measures can reduce health and environmental damages caused by local and regional pollution, *and* how contemporary Chinese policies regarding energy efficiency improvements, renewable energy, air pollution abatement, and cleaner production may lead to reductions in GHG emissions.

Project: Benefits and Costs to China of a Climate Commitment

The project aims to engage Chinese and Norwegian researchers and policy advisors in a dialogue on Chinese policy options for control of GHGs.¹⁸ It emphasizes options that combine climate abatement with environmental and economic improvements for poor and marginalized groups, and encourage sustainable development. The objective is to provide motivation for a Chinese commitment and contribution to a climate treaty following the first commitment period. As many as twelve associated scientific publications are listed on the project's website.

Cooperation partner: ECON.

Funding: MFA.

End date: 31.12.2008.

Project leader: Kristin Aunan.

¹⁶ www.bjerknes.uib.no/pages.asp?kat=3&lang=2

¹⁷ www.cicero.uio.no/about/index_e.aspx

¹⁸ www.cicero.uio.no/projects/detail.aspx?id=30184&lang=EN

Project: Linked Issues as a Way to Broaden Participation in the Climate Regime –LIBRO

The aim of the project is to broaden the participation in the climate regime, which is crucial for global emissions to be curbed significantly.¹⁹ Countries that presently do not participate may for various reasons view the benefits of mitigation as not outweighing the costs. This project's aim is to study the extent to which certain issues inherently linked to GHG mitigation – air quality and energy technology – have the potential to broaden participation in the climate regime if they are addressed through international cooperation. The co-benefits of GHG mitigation through air quality improvements can raise a country's net benefits, and thereby make mitigation more attractive. The project includes a PhD project.

Funding: MFA.

Duration: 2006 – 2011.

Project leader: Kristin Aunan.

3.3 Center for Environmental and Social Research – CIENS

CIENS is a strategic research collaboration between several research institutes and the University of Oslo.²⁰ The centre is built on a shared scientific strategy and research program and cooperation on research and information projects. Relevant projects by CIENS' members are listed under the headings of their owners.

Members

CICERO

University of Oslo's Department of Meteorology – met.no

Norwegian Institute for Urban and Regional Studies – NIBR

Norwegian Institute for Air Research – NILU

Norwegian Institute for Nature Research – NINA

Norwegian Institute for Water Research – NIVA

Institute of Transportation Economics – TØI

University of Oslo's Department of Geosciences

Norwegian Water Resources and Energy Directorate – NVE (associated member)

3.4 ECON

Econ Pöyry (ECON) is an international consulting firm offering insights and understandings of the interactions between markets, technology and

¹⁹ www.cicero.uio.no/projects/detail.aspx?id=30124&lang=EN

²⁰ www.ciens.no/

policies.²¹ ECON has almost 20 years of experience in creating innovative solutions and high quality advice and analysis to help multi-lateral agencies, governments, institutions and private sectors address issues within the fields related to environmental, climate and energy policy.

Project: Cooperation with the Counselor's Office of the Chinese State Council

In 2007 ECON and the Counselor's Office of the Chinese State Council signed a Memorandum of Understanding on cooperation on energy and environmental issues, marking a significant breakthrough for ECON in China.²² Output from the cooperation will include co-hosting a forum on energy, climate and emission control. The Counselors' Office is a Minister-level organization in China with direct access to China's top leaders. ECON will function as a think-tank for the Office on issues of energy, climate and environment, including advice on policy and institutional issues as well as appropriate technologies. The Counselors' Office is particularly interested in learning about 'the Nordic Model' in terms of technology, policy and institutions. Information on research projects which are cooperations between ECON and CICERO are listed under the heading of CICERO. www.econ.no

Project: Environmental Economic Impact Assessment in China: Problems and Prospects

Use of economic valuation methods to assess environmental impacts of projects and policies has grown considerably in recent years.²³ However, environmental valuation appears to have developed independently of regulations and practice of EIA, despite its potential benefits to the EIA process. ECON's article 'Environmental Economic Impact Assessment in China: Problems and Prospects' (Lindhjem et al. 2007) assesses the problems and prospects of introducing environmental valuation into the Chinese EIA process through case studies of the construction industry and regional pollution problems. The paper demonstrates the potential usefulness of environmental valuation but also discusses several challenges to the introduction and wider use of environmental economic impact assessments, many of which are likely to be of relevance far beyond the Chinese context. The paper closes with suggesting some initial core elements of an EEIA guideline.

²¹ www.econ.no/index_page.asp?C=23&I=1700&iLang=1&mnusel=a185a253a

²² www.econ.no/modules/module_123/proxy.asp?I=2021&C=9&D=2&mnusel=a185a190a192a248a

²³ www.econ.no/modules/module_123/proxy.asp?I=1205&C=9&D=2&mnusel=a185a190a192a248a

3.5 Fridtjof Nansen Institute – FNI

The Fridtjof Nansen Institute (FNI) is an independent foundation engaged in research on international environmental, energy and resource management politics.²⁴ Chinese energy and environmental politics is among FNI's focal points of research, focusing on analyses of the country's environmental, climate change and energy problems and policy; the working of China's environment-related bureaucracy and decision-making, analyses of the role of China in the global climate change regime and other environmental and energy issues. FNI's sinologists hold valuable language and regional competence.

Project: Key Actors in the International Climate Regime

A number of key actors in the international climate regime are currently accumulating experiences from past and ongoing climate negotiations, from the workings of the Kyoto mechanisms, as well as from the implementation of climate policies. The objective of this project is to bring together the lessons that can be learned from the Kyoto Protocol implementation so far, and discuss the consequences for the negotiating positions of key actors, for Norway's potential role in the negotiation process, and for the feasibility of post-2012 climate agreements. The project includes studies of the following state actors: The United States, EU, China and the G-77. In addition, non-state actors such as energy companies and environmental non-governmental organizations (NGOs) are also studied. The aim of the case studies is to shed light on how implementation of climate policies will affect the future of the international regime. The study will also analyze the implications for Norway.

Duration: 2004 – 2008.

Project leader: Gørild Heggelund.

Project: China's Climate Change Policy – Through the Prism of Energy Policy

This project consists of three separate sub-projects, all investigating topics related to China and climate change policy. The first concerns China's international climate policies, investigating what the country's interests in the different international arenas are, and in which direction policy is moving. Second, status for CDM in China is analyzed, including policy and project development. The third part consists of this very mapping of Norwegian activities in China in the fields of energy and climate-related issues.

Duration: initiated in 2007, end date pending.

Project leader: Gørild Heggelund.

Cooperative partners: Sun Ying, independent Chinese CDM expert. Dr. Pan Jiahua, Professor at the Research Centre for Sustainable Development at CASS and IPCC member.

²⁴ www.fni.no/about.html

3.6 Nansen Environmental and Remote Sensing Center – NERSC

NERSC is an independent research institute affiliated with the University of Bergen which conducts basic and applied environmental research funded by national and international governmental agencies, research councils and industry actors.²⁵ NERSC aims to make a significant contribution to the understanding, monitoring and forecasting of the world's environment and climate on regional and global scales. This is done through coordination and participation in national and international research programs. www.nersc.no

Project: DYNAMITE – Understanding the Dynamics of the Coupled Climate System

This project is based on the need for a deeper understanding of the intrinsic variability and stability properties of the main climate variability modes in order to assess confidence in the detection, attribution and prediction of global and regional climate change, to improve seasonal predictions, and to understand the shortcomings of current prediction systems.²⁶ The project explores the fundamental dynamical mechanisms of two of the most important modes of climate variability the North Atlantic Oscillation/Arctic Oscillation and the El Niño-Southern Oscillation.

Cooperative partners in China: Institute of Atmospheric Physics of CAS. This is an EU project, in which a number of institutions from the European Union is involved.

Duration: 2005 –2008

Budget: 2 million euro.

Project leader: Helge Drange

3.7 Nansen-Zhu International Research Centre – NZC

Opened in 2003, NZC is located at the Chinese Academy of Sciences in Beijing and focuses on research, education and information about past, present and future climates and climate change as well as environmental issues.²⁷ In addition, there is exchange of students and scientists through the Nansen-Zhu Fellowship Program. The NZC is a joint venture between, on the Chinese side, CAS' Institute of Atmospheric Physics and Peking University, and, on the Norwegian side, NERSC, the University of Bergen and the BCCR.

²⁵ www.nersc.no/main/index2.php

²⁶ http://cordis.europa.eu/fetch?CALLER=FP6_PROJ&ACTION=D&DOC=1&CAT=PROJ&QUERY=1182944916192&RCN=75169

²⁷ <http://nzc.iap.ac.cn/about1-en.htm>

Project: DYNAMITE – Understanding the Dynamics of the Coupled Climate System

Project details listed under the heading of NERSC (above).

3.8 Norwegian Institute for Air Research – NILU

NILU conducts environmental research with emphasis on the sources of airborne pollution, atmospheric transport, transformation and deposition and is also involved in the assessment of the effects of pollution on ecosystems, human health and materials.²⁸ NILU is a member of both CIENS and SINCIERE (see separate listing) and has been active in China for years, on projects relating to air pollution, air quality and pollution abatement. NILU is currently participating in a project on energy efficiency listed under the heading of Norsk Energi (below). www.nilu.no

3.9 Norwegian Institute for Water Research – NIVA

NIVA is the leading Norwegian multidisciplinary research institute in the field of use and protection of water bodies and water quality.²⁹ NIVA's objective is to serve the authorities, the private sector and the public – both nationally and internationally – towards the common goal of an improved aquatic environment through sound water management. NIVA is generally very active in China, but the majority of its projects are not related to energy and climate. www.niva.no

Project: Initiation of a cooperative project on impacts of climate change on water resources on the Qinghai-Tibetan plateau

This project has been a cooperation between, on the Norwegian side, NIVA, and, on the Chinese side, the Bureau of Hydrology and Water Resources Survey of Qinghai Province and Tsinghua University's Department of Environmental Science and Engineering. In addition, the Norwegian Water Resources and Energy Directorate (NVE) has also been an important project partner. As part of the project's output, a workshop was held in Beijing in March 2007. A number of influential Chinese research institutions took part, including representatives from CAS' Institute of Geographical Sciences and Natural Resources Research, the National Climate Centre of the China Meteorological Administration, the Ministry of Water Resources, the Center for Climate Impact Research, and the Bureau of Hydrology and Water Resources Survey of Qinghai Province. The following Norwegian institutions were represented: the University of Oslo (UiO), the Department of Meteorology of the UiO, NVE, NIVA. A project proposal for continued cooperation has been drafted.

²⁸ www.nilu.no/index.cfm?ac=nilu&folder_id=4361&lan=1

²⁹ www.niva.no/symfoni/infoportal/portenglish.nsf

3.10 Norwegian Research Council – NRC

Cooperation in the fields of research and education are central parts of the Norwegian government's China strategy, launched in 2007. In 2007, the NRC received 15 million NOK from the MFA to be used in efforts stimulating the development of further China-related research. An important part of this work will be further development of the NRC's agreement with MOST. The NRC has also funded approximately 80 bilateral research projects (BILAT). Relevant on-going projects funded through BILAT are listed under the headings of their respective owners. www.forskningsraadet.no

Project: CO-REACH

CO-REACH is a network of European science and technology (S&T) policy and funding organizations involved in promoting research cooperation with China in the natural sciences, medical and life science, engineering sciences, social sciences and humanities. This network is intended to create coherence and synergy in Europe's S&T relations with China. It will do so by promoting the co-ordination of China-related policies and associated research funding programs of individual European countries, and integrating these efforts with those of other multi-lateral European initiatives.

3.11 Norwegian University of Life Sciences – UMB

UMB is cited as a potential cooperative partner on the project 'Environmental cooperation on China and South East Asia' listed under the heading of the Norwegian State Pollution Authority (above). www.umb.no

3.12 Norwegian University of Science and Technology – NTNU

NTNU is cited as a potential cooperative partner on the project 'Environmental cooperation on China and South East Asia' listed under the heading of the Norwegian State Pollution Authority (above). www.ntnu.no

3.13 Norwegian Water Resources and Energy Directorate – NVE

NVE is a governmental body under the Ministry of Petroleum and Energy, responsible for the administration of Norwegian water and energy resources.³⁰ The goals of NVE are to ensure consistent and environmentally sound management of water resources; promote an efficient energy market and cost-effective energy systems; and contribute to the economic utilization of energy. NVE takes part in R&D and international cooperative efforts in relevant fields. NVE is an associate member of CIENS. www.nve.no

³⁰ www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=9347&mids=855

Project: Initiation of a Cooperative Project on Impacts of Climate Change on Water Resources on the Qinghai-Tibetan Plateau

This project is listed under the heading of NIVA (above).

3.14 SINTEF

The SINTEF Group is a large independent research organization, every year supporting the development of among 2000 companies from Norway and other countries via research and development activities.³¹ It aims to generate new knowledge and solutions for its customers based on research and development in the fields of technology, natural sciences, medicine and social sciences. The Group is structured into several research divisions, among which are SINTEF Petroleum and Energy consisting of SINTEF Energy Research and SINTEF Petroleum Research. SINTEF Energy Research as well as SINTEF Building and Infrastructure are members of nec. Sintef is an INTSOK member (see separate heading). www.sinteff.no

Project: Chinese LNGP Pipeline Insulation

China is looking to compliment its energy sources by importing LNG and massive related developments are underway. The transport and storage of LNG requires well-insulated systems to avoid heat loss. SINTEF's expertise in the field led to a cooperation with the Chinese company HTN Beijing Pipeline Equipment. The goals of the cooperation are competence building among the employees of HTN; testing of pre-insulated pipes; plan and implement big scale tests at the HTN plant in Beijing. According to SINTEF, this cooperation has helped shorten the development period of LNG transportation pipes by several years.

3.15 Sino-Norwegian Center for Interdisciplinary Environmental Research – SINCIERE

SINCIERE is a cooperation between the Chinese Academy of Sciences (CAS) and the University of Oslo's Centre for Interdisciplinary Environmental and Social Research (CIENS).³² It is funded by membership fees from its 10 founding and 6 associated members as well as by the NRC (SINCIERE 2008). The center aims to be a catalyst and intermediary between China and Norway within the field of environmental research by facilitating interdisciplinary and policy-relevant research; student and scientist mobility between member institutes and be a hub for a broad specter of associated institutions. Given its interdisciplinary approach, SINCIERE seeks to develop new approaches linking the natural and social sciences within environmental research. Among the Center's planned activities for the period 2008-2009 are further development of the research framework 'Driver – Pressure – State – Interactions and Responses – DPSIR'; a website launch; the acquisition of funding for

³¹ www.sintef.no/content/page1____507.aspx

³² www.nibr.no/content/view/full/3330

matchmaking events between relevant Chinese and Norwegian parties; generation and facilitation of new research projects; and franchising of research projects (SINCIERE 2007a). Members with relevant on-going projects are listed under separate headings.

Members

Center for International Climate and Environmental Research – CICERO
ECON

Fridtjof Nansen Institute – FNI

Norwegian Institute for Urban and Regional Research – NIBR

Norwegian Institute for Air Research – NILU

Norwegian Institute for Nature Research – NINA

Norwegian Institute for Water Research – NIVA

University of Oslo's Department of Meteorology, met.no

Project: Sino-Norwegian Cooperation on Environmental Research in the Beijing-Tianjin area

SINCIERE has been invited by CAS to partake in a large-scale project together with other Chinese universities and research institutes (SINCIERE 2007b). The project is set to the strategically important and economically fast-growing Beijing-Tianjin area. In relation to this, other projects, some of which relate more closely to the fields of energy and climate, are suggested. As the region, parts of which made up of a new Special Economic Zone, is given high priority for continued rapid economic expansion, the pressure on the environment is only increasing. Increased air pollution and GHG emissions due to increased energy consumption and transport are expected.

Duration:

Funding: CAS, 30 million renminbi (RMB) over five years.

3.16 University of Bergen – UiB

Projects related to UiB are listed under the heading of NERSC.

3.17 University of Oslo – UiO

Projects related to UiO are listed under the headings of CICERO, CIENS and SINCIERE.

4 The Business Field

4.1 Aker Kvaerner

Aker Kvaerner is a provider of engineering and construction services, technology products and integrated solutions comprising several industries, including Oil & Gas, Refining & Chemicals, Mining & Metals and Power Generation.³³ Its core competence lies in project execution, technology, products and integrated industrial solutions. Its oil and gas products and services include reservoir analysis to production and delivery. The parent company in the group is Aker Kværner ASA which employs approximately 24 000 people in about 30 countries. Aker Kvaerner has permanent offices in both Beijing and Shanghai and is an INTSOK member (see separate heading). www.akerkvaerner.com

4.2 Atlantis Deepwater Technology Holding AS

Atlantis is a Norwegian offshore technology company established to commercialize a method for exploration drilling and field development in deep and ultra deep waters called Atlantis.³⁴ In 2007, Atlantis and China Oilfield Services Ltd. reached an agreement for use of the Atlantis deep-water technology in upcoming deepwater exploration activities in China and other South-East Asia Pacific countries. Atlantis company is an INTSOK member (see separate heading). www.atlantis-deepwater.com

4.3 Confederation of Norwegian Enterprise – NHO

As part of neec's Energy Management Program, NHO and Innovation Norway is cooperating with NHO's Chinese counterpart, the Chinese Enterprise Confederation (CEC), on a project in which the Chinese project participants learn from Norwegian expertise on energy saving and efficiency in building used for business and production as well as homes.³⁵ Chinese delegates have visited businesses in both the energy field and others as well as waste treatment and research facilities in Norway. Energy Savings International AS – ENSI is also a part of this project (below). In addition, NHO, hired by Innovation Norway, cooperates with Norsk Energi and a range of other companies (below). www.nho.no

4.4 Det Norske Veritas – DNV

DNV is a foundation established in Norway in 1864 to inspect and evaluate the technical condition of Norwegian merchant vessels.³⁶ Its core competence since then has been to identify, assess, and advise on risk management. Today, among other things, DNV is involved in CDM

³³ www.akerkvaerner.com/Internet/AboutUs/default.htm

³⁴ www.atlantis-deepwater.com/The_Company.asp

³⁵ www.nho.no/article.php?articleID=18874&categoryID=347

³⁶ www.dnv.com/about_us/index.asp

verification in China. DNV has worked internationally since 1867 and in China since 1888. DNV is an INTSOK member (see separate heading). www.dnv.no

Project: LNG Terminal Project with China National Petroleum Corporation – CNCP

CNPC has signed a contract with DNV Energy to provide technology services for CNPC's LNG import terminal project in Dalian, Liaoning Province.³⁷

Project: Software Contract with China National Offshore Oil Corporation (CNOOC)

CNOOC has signed a 2.7 million NOK contract with DNV Software Greater China on Sesam, a software solution for the design of floating offshore installations.³⁸

Project: Environmental Risk Assessment Software Contract with Sinopec

DNV has signed a 300 000 US\$ software contract with Sinopec for safety and environment risk assessment.³⁹ The contract provides Sinopec with licenses of DNV's Safeti software for risk mitigation of flammable, explosive and toxic accidents. The agreement between Sinopec and DNV also includes an extensive training package in theoretical and practical application of Safeti and quantitative risk assessment.

Project: Improving Chinese Energy Efficiency

The Energy Research Institute of the National Development and Reform Commission in China is collaborating with DNV to improve energy efficiency in Chinese industry.⁴⁰

4.5 Elkem Carbon (China)

Elkem is an international special metals and materials company producing a wide range of quality products serving the world's steel, iron, foundry, aluminum, smelting, construction, chemicals, electronics and photo voltaic and automobile industries.⁴¹ It has technologies for reducing industrial furnace particle emissions, captive renewable energy resources, and comprehensive R&D programs. In 2000 Elkem Carbon (China) bought an old carbon plant in China, establishing its first production base

³⁷ www.dnv.com/publications/oilgas_news/energynews-1-2007/dnvdelivereslngservices.asp

³⁸ www.dnv.com/software/news/dnvsoftwaresecures27mnoksesamcontractwithcnocinchina.asp

³⁹ www.dnv.com/news/DNVSecuresMajorSoftwareContractwithSINOPECinChina.asp?print=1

⁴⁰ www.dnv.com/publications/dnv_forum/no1-2007/ImprovingChineseenergyefficiency.asp

⁴¹ www.nec.no/members.php?m=view&id=Elkem+China

in Asia.⁴² Since the take-over, extensive attention has been paid to technology upgrading, safety standards and environmental protection. www.elkem.no

4.6 Energy Savings International AS – ENSI

ENSI AS is a consulting company with 15 years of international experience in business development and technical assistance as well as capacity building on energy, energy efficiency, renewable energy sources and general environmental issues.⁴³ ENSI cooperates with the NHO and Chinese companies handpicked by CEC. These are companies that wish to improve their situation in terms of energy efficiency and environment. In 2007 they visited Norway in order to learn how energy efficiency is dealt with both at company level and at national level there. www.ensi.no

4.7 Goodtech ASA

Goodtech ASA is a Norwegian technology and engineering company which delivers technology products and services in various fields and operates through its subsidiary companies and activities in the Nordic countries.⁴⁴ The company also has a special focus on and presence in China, through its subsidiaries. Environment and energy recovery are among Goodtech's three main activity areas, offering drinking water and sewage processing plants to the manufacturing industry and both the public and private sector. New technologies for energy recovery are constantly under development in this area. www.goodtech.no

4.8 Green Business Norway

Green Business Norway is an organization acting on behalf of enterprises in the sectors of environmental energy and technology.⁴⁵ It contributes to innovation, cooperation and project development on behalf of its members, among which several are present in China. www.greenbusiness.no

Project: Cooperation on Environmental Issues in Chongqing and the Three Gorges Area

Green Business Norway is cooperating with the Chongqing EPB, based on an agreement between the Norwegian Embassy in Beijing and the Chongqing EPB in 2006.⁴⁶ An agreement on further cooperation was reached, citing priority areas for environmental protection in the region.

⁴² www.elkemcarbon.com.cn/En_index.htm

⁴³ www.ensi.no/

⁴⁴ www.goodtech.no/component/option,com_frontpage/Itemid,1/lang,en/

⁴⁵ www.greenbusiness.no/e_index.html

⁴⁶ www.greenbusiness.no/partnere_full.php?Id=7

Project: Cooperation on Environment and Energy Technology with Hubei Province

An agreement was reached between Green Business Norway with the government of Telemark County and the EPB of China's Hubei Province on cooperation in the fields of environment and energy technology in 2006.⁴⁷ The agreement defines concrete areas of cooperation where Norwegian industry actors will have the chance to develop a position in China by offering knowledge and technology solutions within renewable energy as well as water and waste treatment. Green Business Norway represents Telemark County in this project which is a part of a 39.2 billion RMB environmental project financed by Hubei Province.

4.9 GreenStream Network – GSN

GSN offers advisory services, intermediary or brokerage services and fund management related to renewable energy, emissions trading and GHG offset projects.⁴⁸ GSN's Green Investment Services help project developers, technology suppliers and investors benefit from the emerging GHG and green certificate markets. GSN is cooperating with a range of other companies on Innovation Norway's Environmental Management Program (see Innovation Norway and Norsk Energi).

www.greenstream.net

Project: 50 MW Straw-fired Combined Heat and Power Project

This 410 million NOK project in Jilin Province is a cooperation with Sanhe Green which was launched in 2007 (Berstad 2007). The project addresses the Chinese government's target for biomass power generation by exploitation of the opportunities generated by China's new Renewable Energy Law. Biomass receives attractive support compared to other renewable energy sources. The project will be positioned to generate CERs under the clean development mechanism.

4.10 Grenland Group

Grenland Group is a full-service supplier to the international oil, gas and land based industries.⁴⁹ It delivers products and services within the following business areas: field development and topsides, marine and drilling, industry, products and subsea. The Group has established a permanent office in Shanghai and plans to expand its number of employed engineers from 20 to 200 in 2008. The Grenland Group is an INTSOK member (see separate heading). www.grenlandgroup.com

4.11 Innovation Norway – IN

Established in 2004, the state-owned IN replaced the Norwegian Tourist Board, the Norwegian Trade Council, the Regional Development Fund

⁴⁷ www.greenbusiness.no/partnere_full.php?Id=7

⁴⁸ www.greenstream.net/homepage/default.asp?docId=12954

⁴⁹ www.grenlandgroup.com/

and the Government Consultative Office for Inventors.⁵⁰ IN has an office in Beijing and among IN-Beijing's focal points are environmental and energy technology as well as research and development. IN is the owner of neec, listed below. www.innovasjon Norge.no, www.innovasjon Norge.no/Internasjonale-markeder/Kontorer-i-utlandet/Kina/

4.12 NBT AS

NBT AS is a Norwegian investment company.

Project

In 2007 NBT AS obtained concession from the Chinese government to build wind parks in Jilin Province.⁵¹ The first project will be four wind parks with a combined capacity of 50 MW. In a 15-20 year perspective, NBT plans to invest in as much as 15 5000 MW, which is two thirds of current Norwegian energy production. All in all, the investment will be around 500 million NOK. NBT plans for the wind parks to become CDM projects and has hired a Swedish supervisor and a Chinese company to do the job of organizing the sale and delivery of credits into the international market. www.nbtas.no

4.13 Norwegian Chinese Chamber of Commerce – NCCC

The NCCC aims to provide a professional and social forum for actors wishing to participate in the Sino-Norwegian business and cultural communities, thus promoting business opportunities between the two countries.⁵² NCCC represents a broad spectrum of leading Norwegian industrial and commercial corporations, small and medium sized enterprises as well as individual members. The NCCC also organizes seminars on diversified topics to promote bilateral business and cultural understanding, including a Chinese language course. In 2007 NCCC co-hosted a seminar on energy management and intellectual property rights in China with Innovation Norway in Oslo. www.nccc.no

4.14 Norwegian Energy and Environment Consortium – neec

Neec was established in 2005 and is organized as a multi-client project hosted and operated by Innovation Norway and run through IN-Beijing.⁵³ Members are actively invited to participate in shaping the consortium's development, strategies and activities through membership meetings, workshops and conferences. Members with relevant on-going projects or business operations are listed under separate headings. www.neec.no

Funding: membership fees, IN, MFA, NORAD.

⁵⁰ www.norway.cn/info/trade.htm

⁵¹ www.tu.no/energi/article130000.ece

⁵² www.nccc.no/

⁵³ www.NEEC.no/aboutus.php

Relevant Members

Elkem Carbon (China)
Energy Savings International AS – ENSI
Fridtjof Nansen Institute – FNI
Goodtech ASA
Green Business Norway
Green Stream Network – GSN
Shecco Technology
SINTEF Building and Infrastructure
SINTEF Energy Research
StatoilHydro New Energy

Project: Energy Management in China

Nec is currently working on developing an Energy Management (EM) program in China.⁵⁴ The goal of this project is to provide an understanding of the decision making system of China, relating to its energy and climate policies, in order for Norway to tap the potential for effective cooperation with China in this area. The program's task force has extensive competence and experience in introducing EM systems in industry and building sector in Norway, Eastern Europe as well as former Soviet states. The task force consists of representatives from consultancy firms, research institutes, universities, NHO and CEC. Industries where Norwegian competence and experience is attractive include aluminum, metallurgy, pulp and paper and the building sector. Innovation Norway in Tokyo will support the activities, bringing in Japanese partners where beneficial for the members and utilizing Japanese experience in introducing technology, products and services to the Chinese market.

Potential output: Establishment of local industry networks; tailor-made training program for selected companies; energy planning tools for municipalities; MBA programs hosted by Chinese universities and the introduction of Norwegian products and services to established EM networks in China.

Funding: NORAD, ReNew.

4.15 Norwegian Oil and Gas Partners – INTSOK

INTSOK is a foundation founded by the Norwegian oil and gas industry in cooperation with the Government (personal communication, Skretting). It provides support for the internationalization of the Norwegian oil and gas industry, working with Norwegian companies worldwide to help them succeed in doing business internationally.

⁵⁴ www.innovasjon Norge.no/Satsinger/Sektorsatsinger/Energi-og-Miljo/Nyheter/NEECs-Energy-Management-program-in-China-taking-shape/

INTSOK has a representative office in Beijing and INTSOK China is working especially to provide companies with market information; provide meeting places between Norwegian companies and potential clients; organize seminars and conferences to market Norwegian technology; and provide assistance to individual INTSOK partners. Its services are restricted to members. Among INTSOK's members in China several are active in the oil and energy field. These are listed under separate headings. www.intsok.no

Funding: activities are funded jointly by the industry and the government.

INTSOK partners active in China

ABB	Kongsberg M
APL	Leirvik
AGR	LMG Marine
Aibel	MI Epcon
AkerKvaerner	Marine Aluminium
AkerKvaerner Maritime Hydraulics	Marintek
Atlantis	Master Marine
Autronica	Multikonsult
Bjørge	Novenco
ClampOn	Rapp Bomek
DNV	Scana Industrier
Eksportfinans	Scandpower Risk
EMGS	Siemens
FMC	SINTEF
Framo Eng	SPT Group
Frank Mohn	StatoilHydro
Grenland Group	Uniteam
Heilifuel	

4.16 Norsk Energi

Norsk Energi ('Norwegian Energy') is a leading consultancy within the fields of energy, environment and security. Its services include consultancy, project planning, technology development, training and control.⁵⁵ Its former projects in China include a study on energy efficiency service centers, energy management training and an energy and air quality management study. www.energi.no

Project: Energy Efficiency

Whereas no energy recovery power plants for electricity production exist in China as of yet, the Norwegian ferroalloy industry has close to 30 years of experience in energy recovery and full energy recovery power plants exist at for example several of Elkem's plants in Norway. As a part of IN-Beijing's Environmental Management Program for China (above), Norsk Energi is identifying potential CDM projects in the Chinese ferroalloy industry (Borchsenius 2007). The project will continue in 2008. Norsk Energi's cooperative partners include the CEC, Elkem, Erdos Metallurgy Group, Greenstream Network, NILU, NHO and Sinosteel Jilin Ferroalloys. Examples of indentified projects include the use of waste heat for steam and electricity generation, as well as the closing of furnaces and utilization of combustible gas at ferroalloy and metallurgy plants. www.energi.no

4.17 Sanhe Green

A Sino-Norwegian joint venture, Sanhe Green develops renewable energy projects in China, one example being bio-energy projects that make use of waste straw from agriculture. Experience in technology and project development has let the company play a leading role in the transfer of environmentally friendly technologies from Europe to China. NBT and GSN, both listed above, are among its owners. As listed above, Sanhe Green cooperates with GSN on CDM projects in China. Sanhe Green has another prospect for a combined heat and power plant identical to the one listed under the heading of GSN. www.sanhegreen.com

4.18 Shecco Technology

Shecco (owned by Hydro Aluminium AS) stands for 'Sustainable Heating and Cooling with CO₂' and is an integrated marketing and communication services provider for the heating and cooling markets working to develop and promote market uptake of solutions based CO₂ as a natural refrigerant.⁵⁶ Shecco will not invest in manufacturing capacity in China, but rather support technology transfer through a daughter engineering company with Chinese engineers trained in transcritical CO₂ technology. www.shecco.com

⁵⁵ www.energi.no/

⁵⁶ www.shecco.com/about/

4.19 StatoilHydro ASA

StatoilHydro has oil production facilities in China and is working towards establishing new project in the fields of oil and gas (personal communication, Nørstebø). StatoilHydro's project in the South China Sea was thought to be an unjustifiable investment in a marginal field, but was nevertheless made possible with new technology. It has now been in operation for more than twice as long as expected. An exception from the normal 49% foreign ownership was made due to the low expected value and StatoilHydro therefore has a 75% stake, which is highly unusual in China. Production will likely be closed down in 2008, as the field is now empty. StatoilHydro is an INTSOK member (see separate heading). www.statoilhydro.no.

StatoilHydro ASA's New Energy Unit is engaged in business development within new and cleaner energy solutions.⁵⁷ Its efforts focus on the reduction of GHGs; increased use of cleaner energy carriers; and the development of new energy solutions based on hydrogen, energy efficiency, renewable energy and CO₂ management. Its operations in China are on the planning and scoping stage, but the company has established a representative office in Beijing (personal communication, Nørstebø).

4.20 Vardar

This Norwegian power company is in the process of evaluating prospective investments in the Chinese wind energy industry, in cooperation with Hubei Energy Resource Group and Long Yang Energy (personal communication, Rauboti). The investments would include the building of a 150 MW wind park and the company's share of the total costs, one third, would amount to 500 million NOK. As per October 2007 the project was halted, due to uncertainty about the fundamental partnership conditions. Vardar is looking to invest in other Chinese wind power projects, but nothing concrete has been established thus far. www.vardar.no

⁵⁷ www.statoil.com/newenergy

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