



Economic and Social Council

Distr.: General
4 February 2013

Original: English

Economic Commission for Europe

Committee on Sustainable Energy

Steering Committee of the Energy Efficiency 21 Programme

Twenty-fourth session

Geneva, 17 April 2013

Item 4 (e) of the Provisional Agenda

Mitigating Climate Change through

Attracting Foreign Direct Investment in

Advanced Fossil Fuel Technologies

Mitigating Climate Change through Attracting Foreign Direct Investment in Advanced Fossil Fuel Technologies

Note by the secretariat

I. Background

1. A significant number of United Nations Economic Commission for Europe (UNECE) member States, in particularly those with the economies in transition, face the challenge of low-efficient electricity generation fleets. In some countries the average age of the fleets exceeds 40 years, which is a typical operational lifespan of electrical power plants.
2. In 2006, the Committee on Sustainable Energy recognized the importance of encouraging investment in the electricity sector in order to increase its energy efficiency and decrease its carbon intensity. To carry out this work, the Committee established a subsidiary body: the Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels.
3. The Ad Hoc Group of Experts has on several occasions discussed principal challenges the electricity sector faces in the 21st century. They singled out the challenges of how to:
 - (i) secure an adequate energy supply at a reasonable cost;
 - (ii) reduce the greenhouse gas emissions; and
 - (iii) manage intelligently energy demand to lower consumer bills.

4. The Development Account is a capacity development programme of the United Nations Secretariat, established in 1999, aiming at enhancing capacities of developing countries in the priority areas of the United Nations Development Agenda. It is funded from the Secretariat's regular budget and has a biannual budget of \$29.2 million funding with around 40 projects implemented by 10 entities.

5. In 2009 UNECE Sustainable Energy Division submitted a project proposal to be funded from the Development Account. The proposal brought together three concepts: mitigating climate change, foreign direct investment, and advanced fossil fuel technologies. The project proposed to tackle challenges in attracting needed investment to increase energy efficiency of power fleets of selected countries, where the energy efficiency is relatively low. This proposal was approved in 2010.

6. According to the project document, in its execution UNECE, as the principal agency, cooperates closely with the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). The project covers nine countries: Afghanistan, China, India, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Ukraine, and Uzbekistan.

7. The programme of work of the Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels provided the framework to execute this United Nations Development Account (UNDA) project. The implementing agencies reported regularly to the Ad Hoc Group of Experts on progress in project implementation.

II. Fossil Fuels and Climate Change

8. Fossil fuels supply over 80% of the world's primary energy. In the UNECE region, over 60% of electricity comes from fossil fuels. According to the International Energy Agency (IEA), fossil fuels will continue to be the principal source of primary energy and electricity for the foreseeable future.

9. There is a high level of consensus in the scientific and political communities that anthropogenic emissions of carbon dioxide and other greenhouse gases (GHG) contribute to climate change and global warming. Point sources of emission, such as fossil fuels-fired power plants, are responsible for the lion's share of these emissions. An effective way to decrease GHG emissions is to replace obsolete fossil fuel-fired electricity generation technologies with more efficient ones. Improving the efficiency of electricity generation is one of the low-hanging fruits of the climate change mitigation¹.

III. Foreign Direct Investments

10. Foreign direct investment (FDI) is distinguished from other forms of international investment by two characteristics:

- (i) All international investments are made outside the home country (country of residence) of the investing company, but FDI is made inside the investing firm (distinctive from other forms). Control over the use of the resources transferred remains with the investor, allowing him/her to make investment and operational decisions;

¹ http://www.unece.org/energy/se/pdfs/clep/eg7/ECE.ENERGY.GE.5.2011.INF.1_e.pdf

(ii) While all investments involve the transfer of capital across borders, FDI involves, in addition to capital, other assets and resources, such as technology, management and other skills, access to markets, entrepreneurship, etc.

11. In other words, FDI involves more than just the flow of capital to the host country – it is a package of assets and resources, which are, in many cases, the resources needed by host countries for their economic growth and development. FDI also involves control of the production activity by the foreign investor in host countries. FDI has many other potential benefits, such as, for example, obtaining the needed capital without incurring debt, transfer of knowledge, technology and business transfer, and acting as a catalyst for further capital inflows.

12. The nine countries covered by the project need to increase the capacity to attract foreign investments. Becoming an attractive destination for capital is particularly difficult in case of energy infrastructure projects because of comparably high risks and the long time needed for return on investment.

13. Despite considerable efforts to attract FDI in the last several years, actual levels of FDI into the electricity and coal sectors in many of these countries have been moderate at best. Even China does not attract any significant FDI inflows. Most of newly constructed generation capacity in China is financed from domestic sources of capital. In other eight countries, the sheer magnitude of required investment in the cleaner electricity production necessitates capital flows from foreign sources.

14. The mobilization of the necessary capital resources, however, will require an attractive investment climate: a business friendly environment, favourable macroeconomic performance, and a predictable, fair, transparent and efficient regulatory environment.

IV. Advanced Fossil Fuel Technologies

15. Efficiency of coal- and natural gas-fired power plants can be looked at also in the context of overall energy efficiency – not in the sense of the end-use efficiency that promotes more efficient electricity consumption – this is the efficiency of electricity generation. Improving the “conversion” or “upstream” efficiency, however, has not received the attention it deserves. In the climate change discourse, fossil fuels – and coal in particular – have seldom been mentioned in a positive context. This is unfortunate because any investment in improving the efficiency of fossil fuel-fired electrical power plants has a positive domino effect that enables us to reap huge climate change benefits along the value chain of electricity generation, transmission, distribution and consumption.

16. For the purposes of this project, the expression "advanced fossil fuel technologies" refers to a spectrum of technologies used to prepare fossil fuels for combustion in thermal power plants ("pre-combustion"), the combustion technologies themselves, and the post-combustion treatment of products, including removal and treatment of harmful gases. The project primarily deals with technologies that enable a more efficient use of coal and natural gas in thermal power plants. In this sense, the project is not concentrated on extractive technologies of obtaining fossil fuels, such as advanced drilling.

17. The project deals with fuels that go into high-efficiency, low-carbon emitting power plants, such as:

- (i) natural gas;
- (ii) pulverized or liquefied coal gas; and
- (iii) syngas from underground coal gasification.

18. Project addresses to a certain extent pre-combustion technologies such as underground coal gasification (UCG), surface coal gasification and Fischer-Tropsch processes, coal and natural gas preparation (such as drying, removal of impurities, and increase of calorific value).

19. Combustion technologies are at the core of this project. In natural gas-fired plants, the project concentrates on combined cycle gas turbines (CCGT) and combined heat and power (CHP) plants using gas. As far as coal-fired power plants are concerned, the project primarily deals with integrated gasification combined cycle (IGCC), supercritical pulverized coal (SCPC) and ultra-supercritical pulverized coal (U-SCPC).

V. Project Objectives

20. The principal goal of the project was to enhance the nine governments' abilities to attract foreign direct investments (FDI) into advanced fossil fuels technologies, which would support their energy security and low-carbon sustainable development.

21. Concretely, the project was expected to:

- (i) Increase the skills to develop and maintain an attractive investment climate to encourage FDI into the electricity sector based on coal-fired electricity sector, to meet the growing demand for electricity and achieve related climate change mitigation goals;
- (ii) Improve cooperative relationships between energy policy makers in the countries with economies in transition and the investors;
- (iii) Increase the skills to develop electricity-related pre-feasibility studies;
- (iv) Exchange experiences and lessons learnt in fostering investment in cleaner electricity generation among the countries covered by the project and possibly beyond.

22. To achieve these objectives, the project encompassed the following activities:

- (i) Develop baseline and a comparative analysis on electric power generation status and infrastructure. A particular emphasis should be given to the possibility to apply advanced fossil fuel technologies and the ways to finance them from foreign sources of capital. This activity seeks to establish a benchmark against which the electricity generation investments and regulatory frameworks might be measured;
- (ii) Develop and arrange regional workshops that would provide an opportunity to exchange ideas with the officials and share with them the results of the baseline studies and comparative analysis. The workshops would educate the officials from countries on foreign direct investment into advanced fossil fuel technologies, and review with them desirable changes to existing policy, legal and regulatory frameworks that would lead to a more favourable investment climate for the power generation projects based on cleaner fossil fuel technologies;
- (iii) Provide technical assistance to the national officials through two or more broad-based technical training workshops, to educate them on technical and policy options for cleaner electricity production;
- (iv) Provide technical assistance to national experts to develop pre-feasibility study on advanced and cleaner electricity generation and related fossil fuels-based energy project in each country.

VI. Implementation and Results

23. All project deliverables were finalized by 31 December 2012. Table 1 provides a framework with expected accomplishments (EA), indicators of achievement (IA), and activities (A) carried out, as called for by the project document.

Review of the performance indicators and activities as per logical framework of the project document

EA1

Increased skills to develop and maintain an attractive investment climate to encourage foreign direct investment into power sector based on coal and other fossil fuels to meet the growing demand for electricity and achieving related climate change goals in countries with economies in transition

IA1

(Quantitative performance indicator of achievement related to EA1)

The creation of long-term human capital expressed as the number of institutions as well as regional, national and local officials who are able to design and implement effective and enabling legal/regulatory frameworks supporting foreign direct investment into cleaner electricity production from coal and other fossil fuels by the end of 2012.

Quantitative results achieved for EA1:

All nine country baseline studies were finalized in 2011 and 2012. In addition to three workshops held in 2011, four more regional workshops were held in 2012: in Ukraine, India, China and Kyrgyzstan, attended by over 300 participants from more than 100 Governmental agencies, institutions, Academia and energy and electricity companies. Final conference was attended by 114 delegates.

Qualitative results achieved for EA1:

All baseline studies were written by consultants that were nationals of countries covered by the project. During the process of compiling the needed information and drafting the studies, the national consultants interacted with various national institutions, such as ministries of energy, economy, environment, investment promotion agencies, research institutions and academia. These interactions helped create a network of professionals involved in this process, helping them to develop skills needed to create an attractive investment climate.

The baseline studies were presented and discussed at regional and technical

workshops, which provided another learning platform. These presentations allowed for more productive cross-sectoral and cross-country interactions that were fed back into the studies, increasing their value.

The implementing agencies (UNECE, UNCTAD and ESCAP) established communications with institutions and officials from all countries covered by the project. The primary purpose of the workshops was to enable participants to design and implement effective and enabling legal/regulatory frameworks supporting foreign direct investment into cleaner electricity production. To this end, the implementing agencies developed in-house training material on foreign direct investment (with UNCTAD taking lead on this), energy technologies and trends in electricity generation and consumption in the nine and related countries (developed by UNECE).

The synthesis study provided an overview of electricity sectors of all nine countries. The synthesis study proposed a framework with a number of indicators that could serve as a benchmark against which the power generation investment and regulatory framework and climate in each individual participating country could be measured. The indicator framework (spider charts) could also provide a reference system to rank countries in terms of their internal strengths and weaknesses and external opportunities and threats they face.

A.1.1. Develop a project baseline and a comparative analysis for each targeted country with regard to electric power generation status and infrastructure

Project baseline studies for Afghanistan, China, India, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine, and Uzbekistan.

COMPLETED

Synthesis study/ comparative analysis covering all nine countries.

COMPLETED

A.1.2. Develop and arrange five workshops within the region to allow for networking amongst officials in the region

Regional workshop in Dushanbe, Tajikistan (September 2011)

COMPLETED

Regional workshop in Nanchang, China (November 2011)

COMPLETED

	Regional workshop in Astana, Kazakhstan (December 2011)
	COMPLETED
	Regional workshop in Kiev, Ukraine (May 2012)
	COMPLETED
	Regional workshop in Xiamen, China, (September 2012)
	COMPLETED
	End-of-the project conference and workshop in Almaty, Kazakhstan, (November 2012)
	COMPLETED
EA2	Improved cooperative relationships between energy policy makers in countries with economies in transition and investors
IA2 (Quantitative performance indicator of achievement related to EA2)	Number of networks established by 2012 amongst regional officials in countries with economies in transition and emerging economies in the UNECE region and similar countries in Asia and with the investment community to encourage foreign direct investment into advanced electricity generation fossil fuel-based technologies.
Quantitative results achieved for EA2:	The primary purpose of the workshops was to enable participants to design and implement effective and enabling legal/regulatory frameworks supporting foreign direct investment into cleaner electricity production. Each of the seven workshops (three held in 2011 and four in 2012) resulted in creation of a number of networks among the officials from the countries covered by the project, representatives of the investment community, and representatives of technology providers, which would be instrumental in encouraging foreign direct investment into advanced electricity generation fossil fuel-based technologies.
Qualitative results achieved for EA2	The regional workshops held in 2012 were attended by: officials from the countries covered by the project, representatives of the investment community, and representatives of technology providers. The workshops provided a platform for establishing formal and informal networks. The activities in 2012 (regional and technical workshops, end-of-the-project conference, recommendations of

	the synthesis study) helped create new networks and deepen the existing ones, making them more operational.
A.2.1. Provide technical assistance to the national officials through two or more broad-based technical training workshops, to educate them on technical and policy options for cleaner electricity production.	Technical workshop in New Delhi, India (June 2012) COMPLETED Technical workshop at the Issyk Kul Lake, Kyrgyzstan (September 2012) COMPLETED
EA3	Increased skills to develop pre-feasibility studies on the power sector and related fossil fuel projects in each targeted country
IA3 (Quantitative performance indicator of achievement related to EA3)	Number of developed prefeasibility studies for the advanced cleaner electricity and related coal technologies projects in each targeted country for investors' consideration
Quantitative results achieved for EA3:	Ten pre-feasibility studies were completed, covering all nine countries. Most of the pre-feasibility studies were presented to potential investors at the final investor conference held in Almaty, Kazakhstan, on 14-15 November 2012. In addition, around 20 other investment proposals and ideas were presented at the investor conference.
Qualitative results achieved for EA3:	Developers of pre-feasibility studies, as a part of training exercise ("learning by doing") gained first-hand experience on how to present such studies to potential investors and how to answer questions and concerns. The developers of pre-feasibility studies also had the opportunity to see presentations of others and thus learn indirectly. The final investor conference, held in Almaty in November 2012, provided a platform for this exercise.
A.3.1: Provide technical assistance to national experts to develop pre-feasibility study on advanced and cleaner electricity generation	Pre-feasibility studies for Afghanistan, China, India, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine (two), and Uzbekistan. COMPLETED
A.3.2: In cooperation with officials from the region, plan and executive an end-of-the-project conference and workshop	The end-of the project conference Almaty, Kazakhstan, 14-15 November 2012 COMPLETED
Project evaluation	Assessment and evaluation of the final implementation of the project, done by an independent project evaluation officer. IN PROGRESS

VII. Next Steps

24. Although the project was completed at the end of 2012, it may serve as a stepping stone for subsequent activities in the field of energy efficiency in electricity generation. For example, UNECE, jointly with the other UN Regional Commissions, is currently implementing another project financed from the eighth tranche of the Development Account, "Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development", which in certain sense builds upon lessons learned from the implementation of the project on attracting FDI in advanced fossil fuel technologies.

25. UNECE Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels continues to be involved in this field. At its next session, scheduled for 30 April 2013, the Ad Hoc Group of Experts will review this project and propose further activities in the field of energy efficiency of electricity power plants. Given the strengthened mandate given to the Ad Hoc Group of Experts by the UNECE member States as an outcome of their informal consultations, it is quite likely that the Ad Hoc Group of Experts will also be more involved in the field of carbon capture, use and storage, which is closely related to the energy efficiency and environmental performance of the economy.
