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Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and other Fossil Fuels

Sixth session
Geneva, 22-24 November 2010

Report of the Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels on its Sixth Session

I. Introduction

1. The Sixth Session of the Ad Hoc Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels was held on 22-24 November 2010 in Geneva, Switzerland.
2. The session was attended by 91 participants from 30 UNECE member-states: Albania, Azerbaijan, Belgium, Bulgaria, Bosnia and Herzegovina, Canada, Croatia, Czech Republic, Cyprus, France, FRY of Macedonia, Germany, Hungary, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Norway, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Switzerland, FYR Macedonia, Turkey and Ukraine, United Kingdom and United States of America.
3. Representatives of Japan participated under Article 11 of the Commission's Terms of Reference.
4. European Bank for Reconstruction and Development was also in attendance.
5. Mr. Branko Terzic (United States of America) was Chairman of the Session.

II. Adoption of the agenda (agenda item 1)

6. The provisional agenda (ECE/ENERGY/GE.5/2010/6) was adopted.

III. Election of Officers (agenda item 2)

7. The Ad Hoc Group of Experts elected its Bureau to serve during 2010-2012 period. The officers are: Mr. B. Terzic (United States of America), Chairman; Ms. R. Hampton (United Kingdom), Mr. V. Budinsky (Czech Republic), Mr. H. Cetin (Turkey), Mr. S. Shumkov (Russian Federation) and Mr. B. Gryadushchyy (Ukraine), Vice-Chairmen.

IV. Opening remarks from the Chairman (agenda item 3)

8. The Chairman of the Ad Hoc Group of Experts, a member of the secretariat of the United Nations Economic Commission for Europe (UNECE), Geneva, Switzerland, a representative of e8 organization and a representative of World Energy Council opened the event by welcoming all participants and in particular those from the Eastern and Central Europe and Central Asia.

V. Outcomes of the High-level Dialogue on Fostering Investment in Electricity Generation in Central and Eastern Europe and Central Asia, Montreal, Canada, 14 September 2010 (agenda item 4)

9. After the Chairman of the Ad Hoc Group of Experts reported on the successful High-level Dialogue held in Montreal, the meeting delegates requested the UNECE secretariat to have the official report in three languages available for the next meeting of the Ad Hoc Group of Experts.

10. The meeting participants greeted the outcome of the Montreal event.

11. The present member-states took note with deep appreciation of the strategic partnership that the UNECE made with e8, EBRD and WEC on the critical issue of fostering investment in electricity generation in economies in transition.

12. The delegates requested the UNECE secretariat to make every effort to support the strategic partnership with e8, EBRD and WEC on promoting investment in electricity generation not only in the UNECE region but also in other regions with emerging market economies.

13. The delegates requested the UNECE secretariat to strictly follow and comply with conclusions and recommendations of the High-level Dialogue in Montreal including the specified steps for the organization of the Geneva Electricity Forum.

14. The member-states requested the UNECE secretariat to report in writing to the Chairman and the Bureau on the secretariat's compliance with conclusions and recommendations of the High-level Dialogue in Montreal.

VI. Clean Electricity Production Forum in collaboration with e8 organisation, European Bank for Reconstruction and Development (EBRD), and World Energy Council (WEC): "Fostering Investment in Electricity Generation in Central and Eastern Europe and Central Asia: Alternative Governmental and Corporate Policies and Strategies" (agenda item 5)

10. The Forum was divided in seven sessions.

Session One: Electricity Generation Investment Case: Stakeholders, Key Issues, Obstacles and Objectives

11. This session provided an introduction to the work and described the stakeholders and key issues to be dealt with. In particular, this introductory session reviewed the principal obstacles for the increased domestic and foreign investments in cleaner electricity production from fossil fuels.

12. The Chairman opened session one with a brief presentation describing the 21st century energy problem: how to have a secure energy supply that is low cost for consumers and that at the same time mitigates climate change. He highlighted the current issue of Atlantic magazine where the cover story was on the use of coal in a cleaner more sustainable way as the way forward. He called for strategic decision making in investment. There are seven types of mitigation methods that could allow for a balance of supply and demand of energy in the future with low carbon emissions and these methods have key issues that require government action before investors can move forward. Studies have shown that for every energy scenario projected in the future, coal is an important factor and its use in a more sustainable cleaner way is imperative. New electric power supply investments as well as investment in carbon capture and storage (CCS) are needed. Twelve pilot projects of \$1billion USD each are under way but the commercial operation of CCS is not expected before 2020. The main issue is to find policies that address government national and international goals while still attracting investment.

13. A representative of e8 organization noted that obstacles must be seen as opportunities. Aging generation plants present an opportunity to redesign policies that can encourage investment in new technology. As it seems that CCS will not be commercially available in 2020 so the focus now should be on what is available. Regional integration can also take off the burden on individual countries to meet demand by themselves. The private sector is looking for stability and certainty in order to invest. Investment will materialize if the right conditions are in place. The legal and policy framework of a country can set the vision and targets expected in the short-term as well as the long-term. While investors need to know where countries are heading, transparent rules from an independent regulator can help in this aspect.

14. A delegate of RWE, Hungary, gave an overview of the situation in Hungary which is influenced by global market trends including the trend to lower carbon emissions. Despite differences between countries, the Hungarian experience could showcase important issues that may also be true for other countries in the region. There is a great potential in improving energy efficiency. Old power plants can be refurbished. There is also large potential in biomass. The country is currently considerably dependant on Russian gas supply and Hungary needs to diversify the connections and sources of supply to develop secure energy

supplies. Regional market can further be developed between Hungary and neighbouring countries. Hungarian market is closely tied to Germany and its carbon pricing and for regional markets to develop similar prices and policies should be in place. The delegate also pointed out that there was potential to further adopt new technologies such as CCS and smart grids in the country. Lastly, he noted that there was a need for increased flexibility in power plant operations to overcome investment obstacles. He also summarized the main obstacles in Hungary: uncertainties in the regulatory environment, limited financing resources that are putting a drag on project investment, a complicated licensing process and the existing public opposition to selected power generation technologies such as hydro-power plants.

Session Two: Comparative analysis of the electric generation and infrastructure in economies in transition and emerging economies

15. Given that the current state of the power generation capacity and related infrastructure in economies in transition and emerging economies determines the initial policy and investment choices, this session was designed to provide a brief overview of the national electricity sectors and thus related investment opportunities.

16. Regional Coordinator for Europe & Central Asia, of the World Energy Council (WEC) opened the session by presenting an overview of the electricity market in Eastern Europe and Central Asia, followed by a closer look at the South East European market. According to the latest trends, the demand for electricity is exceeding generation capacity in the region and there is no push for new generation mainly due to lack of clear national energy and investment policies. There are aspirations to reduce coal's share in energy mix as seen in the closure of local unprofitable coal mines, strong interest for promising new gas pipelines and the political push for renewable energies. However, various energy and electricity subsidies in place have distorted prices. In that framework, the price of carbon would be an additional signal to electricity investors and the WEC is looking to create a global market for carbon.

17. The Coordinator mentioned that the current financial crisis and the lack of a global climate change framework have also negatively affected the energy sector in the region. In terms of the South East European market, there were also some regional characteristics such as low energy consumption per capita, the sector's dependence on Russia for energy supply and technology, the use of local lignite in electricity generation, non cost-reflective energy prices, and the devastating effect that war has caused on the energy sector and infrastructure in parts of the former Yugoslavia. Selected recent refurbishing of electric power infrastructure is financed by foreign grants and funds mainly. However, there is a lack of finance for strategic investments in power generation and in the full energy chain.

18. On the positive side, the enhanced political will to think regionally on security of supplies has resulted in the launch of an initiative to create a regional electricity market and to subsequently connect it to the Pan-European one. Cross-country interconnections within South East Europe region are relatively good but with external countries should be improved. A regional market design needs to be developed to improve the interconnectivity and a set of compatible market rules for the region need to be put in place.

19. The current lack of electricity in South-East Europe due to increasing demand and further exacerbated by reduced electricity supplies has led to shortages/blackouts in Albania, Montenegro and Macedonia, resulting in higher electricity prices. To meet the increasing electricity needs, the new generation capacity of 20GW is necessary in the region, requiring investments in the order of 30 billion Euros. Coal-based thermal power plants need to be refurbished and connections need to be enhanced. Energy efficiency in power generation

should also be a priority while the diversification of the energy mix away from coal and into more gas, nuclear and renewable energy can also help in securing the energy supply for the region.

20. A representative of the UNECE secretariat presented an overview of the main issues in clean electricity production in the region, as discussed in the High-level Dialogue that took place in Montreal, Canada on 14 September 2010. While the power plants in the region are largely obsolete, 60 to 80% of them are close to the end of their reasonable life span. The level of productivity in the electricity sector, when compared to developed market economies, has thus become a problem, reaching on average only 20% in the region. In addition, in most cases the end-user electricity prices do not reflect costs and as such are not economically sustainable. Investments are needed not only in generation, but also in transmission and distribution. It has been estimated that the electricity investments in the area of 250-300 billion Euros are needed, which is beyond the means of the economies of transition in the region. For the time being, the main source of financing in the region comes from foreign direct investment despite the fact that there are sometimes political, technological, cost and logistical challenges.

Session Three: Developing a benchmark investment and regulatory framework

21. In this session, the discussion focused on the establishment of a "benchmark" against which participating countries can measure the attractiveness of their power generation investment and regulatory framework and climate. The key question which was asked was what it is that the investors are looking in the legal and regulatory frameworks?

22. The Chairman highlighted the importance of regulatory frameworks and the role of the government in electricity generation. The national energy policy objective must be either implicit or explicit in the laws. If a country wanted private investment to build energy infrastructure, it would be important to keep in mind that investors feel entitled to reasonable and legitimate profits. The issue is how to find policies which support various government economic and social goals while also attracting investment capital. To attract the capital, policymakers must clarify policy objectives, establish adequate competition (where competition will be introduced), and create non-discriminatory and transparent regulation. Electricity regulatory systems which have attracted capital at reasonable cost have a transparent process, with decisions issued in a timely manner and a balanced consideration to ensure the public perception of the fair and full representation of their interests. Regulation must also be stable and independent. In conclusion, the Chairman reminded participants that regulation is the key to attract capital for investment in electric infrastructure. Private capital is available to meet all needs but attracting private capital at reasonable cost requires good regulatory policy and performance. The parameters of good regulation are known from relevant international experience.

23. A delegate from RWE, Hungary, commented on the Chairman's remarks. He states that the social aspect of electricity generation needed also to be addressed given that income levels are low in Eastern and Central Europe. For example, in Hungary, 15% of the household income is spent on energy. In contrast, the German figure is only 5%. In other countries in the region and compared to Hungary, the figure can be even higher. Hence the issue of energy poverty is something to be addressed by governments. Regulators must separate social subsidies for energy from the real price of electricity so that the right regulatory price signals can reach interested investors.

24. The Chairman added that the governments can have the system separate tariffs for different class of consumers but this could quickly become an administrative burden. A

voucher system for low income consumers is also a possibility. In any case, the citizens should always be told the true price of electricity. This strategy can especially help in the long-run when government begin to increase electricity prices (through reduced subsidies) from unsustainable low prices because consumers can then clearly see that the prices were not increased to give more profit to the utilities but instead because the government subsidies have declined.

25. A delegate from the International Sustainable Energy Organisation agreed with the exposition of the importance of the regulation framework and underlined the role of the United Nations in making related international regulation standards.

Session Four: International perspectives on investment in power generation

Part I: Focus on perspectives from project developers, technology vendors, power industry actors

26. Project developers, technology vendors, and power industry actors presented the key risk areas hampering the project investment in the region, with a focus on risk (including financial risk) associated with the deployment of advanced cleaner power technologies with significant potential in the region.

27. A delegate from RWE, Hungary moderated the session and reviewed the investment in clean electricity generation in Hungary. Hungary is among the top three countries in Europe with the highest dependency on gas in its energy fuel mix. The share of renewable energy is very low. Gas demand is driven by power plants and households. Hungary is a net importer of electricity with strong interconnections with neighbouring countries. Hungary privatized its power industry in 1995 and now large European players dominate the sector including RWE. International investors, however, faced several challenges after the privatization. For example, good technical knowledge and equipment was not accompanied by required commercial and financial skills. Also, electricity and gas tariffs were too low to cover costs and thus companies were unprofitable. However, with the regulation office established in 1993, Hungary has preserved the duality of regulated and liberalized power markets, giving eligible customer the choice of a more favourable rate. RWE Hungária is active in the Hungarian energy sector and a major player in both the electricity and gas sectors. As mentioned before, the aging Hungarian power plants require large investment in gas, nuclear and renewable electricity generation. Sinergy, the contracting subsidiary of RWE is a market leader in cogeneration plants for industry and district heating plants. RWE Hungária has also developed the lignite-fired Mátra plant in several steps. Planned expansion of lignite block was stopped due to environmental concerns and CO₂ emissions. Utilization of the Mátra site for future projects in gas and renewable energy is under consideration. Challenges for future cleaner power generation investments revolve mainly around the reduction of carbon emission, while at the same time increasing the security of supply and enhancing competitiveness.

28. A representative of ABB Italy highlighted that the real bottleneck in the development and utilization of power plants in the region was coming from the transmission networks. There is no possibility of a real electrical European integrated market without solving the problem of new interconnections and optimally using the existing ones. Smart grid concepts applied to existing transmission lines could be of substantial help to maximise the performance of existing assets. However, one major issue that continues to create the obstacles is the long lead time between having the concept of a new transmission line in place and its actual commission and construction. The average time from initial thinking to commissioning of a new 400 kV line of some tens of km is 12/15 years in Europe while in

China it is around 3 years for 2,000 km of a new ± 800 kV UHVDC line. With such a difference, the Europe's competitiveness could be at stake.

29. The investment situation in Slovakia was presented by a delegate from Slovenske Elektrarne (SE) and Enel (Italy), who is the 66 per cent owner of Slovenske Elektrarne. SE is the leading generation company in Slovakia with a diversified production portfolio of which 88 per cent is CO₂ free. The company currently has a strong financial position with company efficiency rising due to the performance improvement of the generation assets and of the process efficiency. The creation of the sufficient volume of electricity through clean production at competitive and affordable prices seems to be sustainable solutions for energy supply in Slovakia. To meet these priorities, investors need to define specific projects while leveraging on their asset portfolio and the country's technologies potential. In Slovakia, and in SE's case, the focus has been in developing capacity in nuclear, thermal, and renewable energy (with focus on biomass). SE has invested in the nuclear energy through its EMO 3 and EMO 4 which seems to be the largest electricity investment in the region. The project is fully financed by SE and it has contributed to country's economy during the crisis period. The project is also helping recreate a nuclear energy platform in Slovakia by giving all the stakeholders an opportunity to play an active role in this project in EU and stimulating R&D, innovation centers and universities. Most importantly, the project will provide a long term guarantee for the country's energy security (adding 7 TWh of additional capacity).

30. The Slovak delegate added that the investments in thermal power plants can also be strategic. Local electricity markets in the Central region advanced during the last few years in their efforts to come closer to developed European markets. Such measures included increasing market liberalization, coupling markets (Czech Republic with Slovakia), fostering an active spot market, etc. which has led to greater transparency of demand and supply and market driven prices. However, some gaps remain that are still preventing the passage from the domestic to regional markets. For example, the consolidation of an efficient regional market to reduce investors' risks, the developments of cross-border infrastructures as well as of the internal grids to reinforce the system and, finally, a coordinated and harmonized market and regulatory mechanisms are required to foster regional integration.

31. During the Questions and Answers session the meeting participants raised several issues such as the applicability of smart metering in Western Europe (in particular in Italy) to Eastern Europe? The representative of ABB Italy responded positively with the information that 30 million electronic meters had been installed in Italy. They currently serve not only to show the tariffs and level of consumption to the customers but not all functionalities are still in place. The other issue of interest was is the comparative capital cost of nuclear energy. The ABB Italy experts informed the participants that the unit cost of nuclear energy was in the range of 60-65 \$/kwh. In the past, the investments in nuclear technology amounted to 2000 Euros/kW while the capital cost of new nuclear units is rather around 3400 Euros/kW. One additional advantage for fostering investment in the nuclear electricity generation could arise when the system operator does not favour renewable energy such as wind, which is the case of Slovakia. Finally, a possible international taxation of products from countries not adhering to international approach to Climate Change through the UN was deemed as politically and commercially nonviable with the remark that related trade issues should be handled by the World Trade Organization.

Part II: Focus on perspectives from financial institutions (local and foreign banks and multilateral development banks)

32. This session focused on presentations and interactive discussion with the financial institutions and multilateral development banks on issues such as risk assessment models, role of the private sector in Public-Private-Partnership financial models and key factors for securing the initial investment and the sustainable replicability of electricity projects.

33. The session was opened the session by a delegate from Siemens Financial Services (SFS) with the presentation on Siemens's perspectives on energy investments. Energy demand is rising due to globalization and urbanization and will continue as those without access to electricity will become connected. Climate change is a major challenge that all countries are facing and as a result, focus is increasingly on renewable energy with governments actively supporting it. Unfortunately, energy project financing in Eastern Europe has become more difficult and in 2009 it was the world region with the lowest amount of new projects financed (by number and scale). For SFS, which offers solutions to the new financing needs at all the stages of the project development, certain preconditions must be met in today's environment to make financing of energy projects feasible. There needs to be sound project economics, robust contractual and legal framework (permits and government approvals), low construction risk, low political risks (especially in emerging markets), extensive due diligence, credible partners and credit-worthy counterparties. The goal is to create a win-win situation that produces stable earnings for public and private partners. For example, for equity investments in infrastructure projects, emphasis is placed on financing the development, construction and operation of the project. Equity investments of this type are mostly minority holdings of 10 to 40 percent and include exit prospects within five years and insurance for country risks where possible and economically viable. For public-private partnership (PPP) financing models, the project must be clearly identified and defined. Due to the long service life, efficient risk sharing requires a reliable basis for long-term planning. Similarly, the project risk related to the introduction in the electricity market of competing solutions and technologies must be limited throughout the project. PPPs must also have flexibility in their contract design where sustainable solutions are project-focused and not based on standardized stipulations. Finally, the projects could not be used for political purposes like setting low, administrative electricity prices as an election campaign tool. Thus, this risk of project politicization must be low. He concluded that there were the opportunities for financing energy projects in Eastern Europe where by far the biggest target could available efficiency improvements.

34. The energy financing market in Central and Eastern Europe, which is slowly recovering, was discussed by a delegate from CSOB, the Czech Republic. While there are three principal sources of financing, government based, based on a corporate approach or be on a project basis with establishment of a special purpose vehicle (SPV), in all the options the project owners must have related technical and implementation experience, professional practice in similar activities and financial stability. Contractors should have a successful track record and a sound financing standing as well. The contract itself should cover both design and construction with fixed prices (no reserve contract), include liquidity damages in case of delay in the start-up and of lower output/availability as well as to have a warranty package. Also, if a decisive part of technology is to be purchased independently from the overall project construction, a clear risk sharing matrix has to be designed to avoid potential disputes. The key target in the process is to achieve a long term and fixed cash flow margin to ensure the predictable repayment of the financing debt to the borrower and return to the project's owner. While in the region, the lenders appetite is increasing and liquidity is available, the long term political, regulatory and commercial stability is needed, as well as strong and experienced investors and contractors for the investment potential to materialize. Proven and reliable technologies are a necessary condition for the successful energy project financing.

35. Financing alternatives for clean power generation in Central and Eastern Europe were presented by a delegate from Falkenburg Corporate Finance, Hungary. From a banker's perspective, financing in the energy industry requires long term financing (10yrs or more) due to the long asset life. As mentioned before, stable and predictable regulatory framework is required, occasionally with government support of project (depending on the broader regulatory context). Foreign exchange risk is also a factor to be considered. In general,

various risks are considered by banks in the project financing including regulatory risks (permitting, authorization), technology and construction risks, long term operation and maintenance risks as well as market risks (price and volume). These project risks decrease over time and as the power plant project advances through its phases. Tailored financing can be provided to each of the specific project phases. In Hungary, the privatization and launch of the single buyer market model coupled with the transparent regulatory framework led to the entry of large creditworthy industrial players while successful new projects, supported by international and domestic commercial banks, were completed. The current financial crisis has significantly changed financing parameters. It is only that well-prepared projects with strong sponsor support receive funding. Fossil fired projects are now more difficult to finance due to uncertainties regarding carbon pricing in the European Union and because of the policy shift towards renewables such as wind and biomass in the case of Hungary. In long-term projects, banks now focus on reliable sponsors with a track record. In terms of the market risks, several approaches have been practised by financial institutions. While in Central and Eastern Europe it is difficult to secure project financing on merchant basis, the classical power purchase agreement of the 1990's is not anymore possible. The latter is anyhow a must in a disguised form for financing the fossil fuel projects. Carbon risks must be addressed upfront for the fossil fired projects. Finally, the investors and creditors seems to be ready to accept regulatory risks regarding renewables and small sized CHPs (combined heat and power systems) provided that there are feed-in tariffs in place.

36. Several issues were raised during the Questions and Answers session such as the difficulty to have financial institutions take on the merchant risk when the liquidity is not there, the bankability of the project when revenues are based solely on market conditions as well as the regulatory balance between risks and rewards for the private sector. Equally, it was stressed that financing major clean coal projects with carbon capture and storage (CCS) will require from the investor a strong balance sheet. An interesting debate arised around the innovation capacity of the power industry which was hampered by the insufficient research and development, the non recovery of E&D costs through tariffs under some jurisdictions, and the technology being determined by the regulator. At the same time, the link between the utilities and manufacturers for sharing on R&D innovation was deemed necessary. Finally, the valuable role of international financial institutions such as development banks in the financing of projects was evoked with request by selected delegates to those institutions to do more for the project in particular in the development phase.

Session Five: Technical and policy options for attracting investment in power generation – removing key obstacles and setting right policies

37. This session focused on interactive cross-country working group sub-sessions, where participants identified and discussed obstacles to investment and opportunities for policy and regulatory changes in their respective countries so that the favourable regulatory, policy and structural measures could prevail.

38. During this session specific issues addressed included: legal and regulatory frameworks, tariffs, subsidies and cost reduction incentives, financial model options (Joint Ventures, JI/CDM projects, Private-Public Partnerships (PPPs), direct investment etc.), renewable technology options and associated cost/opportunities, regional cooperation, role of the private sector, government, multilateral development banks and institutions and local/regional capacity (R&D/Technology manufacturing/Operations and Maintenance)

39. The Chairman was the rapporteur for Group One. The countries of Group One included Serbia, USA, Switzerland, Slovakia, Italy, Czech Republic, Kyrgyzstan, Romania and representatives from the CIS (Commonwealth of Independent States) Electric Power

Council and the Regional Coordination Council. When participants were asked if the legal and regulatory framework were adequate to support investment, almost all thought it was adequate and working properly yet some countries were more advanced than others. When delegates were asked if the national energy policies were adequate to support the development of cleaner electricity, most of the countries responded that in their view policies were supportive. While all participants were aware of the needs in the energy sector, they did not think that the domestic financial institutions were large and strong enough to develop the electricity sector. Many countries still rely on foreign cooperation for investments in energy and on different mechanisms like regional funds. In terms of level of tariffs and the incentives in place to reduce the costs, the experience varied between countries. For some, electricity prices do not reflect the costs which makes difficult to attract electricity investments. At the same time, many countries do have incentives to increase the efficiency in the electricity sector. Regional cooperation remained an important factor for many countries yet many felt the regional interconnections were still underdeveloped. The choice of financial model for investment in energy projects varied according to project type and country. However, most countries mentioned the choice of public-private partnerships (PPP) and foreign direct investments as the most likely choices for the renewal of the outdated generation capacity.

40. The regional Coordinator of the World Energy Council summarized for the plenary the discussions of Group Two. Azerbaijan, Tajikistan, Kazakhstan, Poland, and Turkey were in the group. All of the countries have national programmes and/or policies looking to 2020, and some beyond to 2030. Targets have been set up in compliance with the expected demand growth and availability of domestic energy sources. All countries seem to have the target to maximize the use of domestic sources and, for energy exporters, to reduce the economic dependency on energy exports. The electricity legal and regulatory frameworks are in place in these countries, with a commitment to continuously improve them. Some of the frameworks set up are more ambitious than others. The direct reduction of CO₂ emissions and the climate change mitigation issues are not directly addressed in the agenda of some of the countries in Central Asia. There is, however, a general tendency to diversify the national energy mix matrix. Regarding the choice of technologies for power projects, the countries consider that the role of international financial institutions should be advisory and that it is up to the individual countries to decide what technologies to use, usually based on cost-effectiveness.

41. Nuclear is an option for some of the countries in the group (two reactors in Poland and five reactors in Turkey are on the map by 2025). In the countries where hydropower has a large share in the electricity mix, the existing electricity tariffs are too low and fail to cover the costs. However, at this stage, the economic situation of these countries does not allow the increase in the tariffs. In European economies in transition, electricity prices are much closer to the market price or even equal. Renewable energy is a part of the national energy mix and their share is forecasted to rise. Country-wise, the choice of the type of renewable energy is based on the domestic source potential. Feed-in tariffs are given a priority and they are set up according to the type of renewable source.

Session Six: Individual and cooperative strategies for attracting the power investments - Country Action Plan preparation

42. During Session Six selected country participants presented and discussed general directions and strategies of their national action plans. To facilitate the action plan elaboration and presentation, the organizers sent an action plan outline and presentation

template to all participants together with the invitation for the event. National country action plan were presented by Serbia, Kazakhstan, Kyrgyzstan, Poland and Turkey.

43. Serbia: The Electric Power Industry of Serbia (EPS) is 100% state owned. Approximately two thirds of the power generated in the country comes from thermal sources, while around one third comes from large hydro plants. Energy efficiency improvements have been made in almost all thermal power plants (TPPs) with electricity production sharply increasing. Ongoing refurbishing and modernization of hydropower plants (HPPs) will increase power capacity, production, and efficiency and extend operational lifetime. Energy efficiency is also being promoted on the demand/consumer side. Overall energy consumption in the country is forecasted to increase by 13% by 2020. Intensive investment activities are being planned and there are four main reasons behind the investment cycle: secure supply under conditions of growing electricity demand; replace the old inefficient facilities at the end of the operation life; meet environmental European Union and national standards; and achieve economic and financial sustainability with increased competitiveness stemming from a higher efficiency. The plan up to 2015 envisages over 9 billion EUR of investments, with about half a billion to be invested into renewable sources. While the government will provide 3.4 billion EUR, 3.8 billion EUR should come from loans and 1.8 billion from strategic partnerships. The bulk of the investments will go on the maintenance of existing power plants and the increase in generation capacity. Priority investment will also be mining as coal is main energy resource for Serbia. New open pit mines will be exploited while the energy efficiency of existing mines will be increased. Coal exploitation needs to be harmonized with environmental protection regulation and new technology must also be introduced. Investments in power generation will be done with strategic partners selected on the basis of tendering procedures. Serbia also has a relatively large potential in hydropower. Investments in the power distribution will be in the order of 700 million EUR. They will cover the reconstruction, replacements and construction of new substations and equipment on different voltage levels. The distribution grid and metering system will also be improved. In conclusion, Serbia's action plan 2010-2015 will focus on reforming and restructuring the energy and electricity sector to find an optimal energy mix.

44. In the Questions and Answers Session it was mentioned that Serbia planned the construction of a 450 MW gas fired plant based upon the existing gas pipeline. Should there be new gas pipeline infrastructure crossing the country, the additional gas-fired power plants could be considered. Equally, on electricity prices, the delegate from Serbia indicated that the final word on the electricity tariffs, currently below economic levels, belongs to the government but that Serbia was working to establish an independent regulator by 2012 within the goal to move towards a liberalized electricity and gas market by 2015. It was worth mentioning that the new planned coal-fired power plant will have the efficiency of 42.5 %. At the same time, with sizeable transmission capacity, Serbia is looking for an increased regional cooperation including an integrated power generation capacity plan for the whole region. The EBRD representative added the importance of the independence of the electricity regulator for the industry and the financial sector which should Serbia keep in mind when designing the regulator's role.

45. Kazakhstan: Over 70% of the total generated electricity in the country comes from coal. The country has a well developed transmission network with a centralized system of operation dispatch control. There is an established regulatory and legal framework for effective operation of the wholesale and retail electricity markets. The country also enjoys availability of considerable energy reserves and has a considerable potential in renewable energy sources. However, the power generation equipment is quite obsolete, there is a shortage of the flexible generation capacity required to effectively cover peak loads, and a lack of a mechanism that can stimulate the construction of new power plants, among other issues. It means that there is a threat of a widening gap between available and installed power capacity. The government adopted a development policy for the power industry as

well as for competitive electricity and capacity markets, along with an action plan for the implementation of the Power Industry Development Program, including a list of projects to be constructed within the timeframe approved by the government. A well-developed legal framework providing favourable investment conditions is currently in place. The government is about to pass a new law on matters related to the power industry and investment activities with natural monopolies and regulated market. By 2013, the government aims to improve the normative and regulatory documents regarding the use of renewable energies. The first increases in the power capacity will be in place in 2015.

46. Kyrgyzstan: The Kyrgyz Republic owns 2% of Central Asia's energy resources, including large coal reserves and 30% of its hydro energy resources, of which only one tenth has been developed to date. In the country's energy balance, the share of imports reached than 50%. There are 70 known coal fields in the territory of the Republic, with total coal reserves estimated at 1320 million tons. There is a large hydro energy potential estimated at 18.5 million kW of capacity and more than 160 billion kWh of electrical energy. The potential for solar energy and wind power exists as well. The government's main actions and goals include reforming the system of management of the energy sector and establishing the necessary institutional frameworks and legal base. The government is also looking to ensure sustainable development of the energy sector and its refurbishing. New electricity generation and transmission capacities are to be commissioned. The renewable energy share in national energy mix is to be increased with the help of a suitable legal base for development of renewable energy in the country. As in the other UNECE countries, the increasing efficiency through energy saving and improving reliability of service to customers remain top priorities. There are macroeconomic and geopolitical barriers to the achievement of these actions and goals. Some of the barriers include significant disequilibrium in the structure and location of generation units and the delay in introducing new power generation capacities. Winter electricity consumption is twice higher than in summer. This means the energy system's load factor is uneven, which makes it difficult to ensure economic efficiency of operation. The current tariffs, which do not reflect market pricing, cover only 60% of costs. Also, the depreciation rate of power generation equipment and electric grids is 50%. The investments planned in the energy sector will be directed to increase the base-load capacity and enlarge the transmission capacity with smaller amounts devoted to the development of the small hydropower projects. Finally, the Fuel and Energy Sector Transparency Initiative (FESTI) will also be implemented to ensure transparency in the process of managing and regulating the fuel and energy sector.

47. Poland: The country has a high coal production with a dependence on gas and oil imports. Demand for electricity is increasing and there is inadequate generation and transmission infrastructure. Opposite to many countries in Eastern Europe and Central Asia, Poland is subject to EU climate and energy directives as a member of the European Union. The country has a national programme for the energy sector which is based on significant reserves of hard coal and lignite and the renewable energy potential. Energy efficiency must be improved, as well as the security of energy supplies. Poland intends to diversify the electricity generation structure by introducing nuclear energy and developing renewable sources such as biofuels. The power transmission infrastructure needs to be modernized. Poland aims to develop a competitive fuel and energy markets while reducing the environmental impact of its power industry. From 2009 to 2012, the Polish government aims to introduce legislative changes including the implementation of the Polish nuclear power programme. The research and development will be supported and the financial structure of the planned investments will be determined. The government plans to begin the realization of projects between 2013 and 2016, mostly in the power generation (25 billion EUR).

48. Turkey: Over the last decade, Turkey's economy has rapidly grown. Turkey's total primary energy supply (TPES) was 99.5 million tonnes of oil equivalent in 2008. Turkey depends on imports for 73% of its TPES, practically all oil and natural gas and most coal.

Demand has grown rapidly in the past two decades, with strong growth particularly from 2001 to 2008 averaging 8.8% per year. The Turkish government has adopted a series of strategies in the energy sector to meet the growing demand. First, there is a need for further diversification in primary energy supply, in terms of energy sources, imports, technologies and infrastructures. Another priority is the development of renewable energy and introduction of nuclear power into the energy mix. The government also intends to build competition-oriented market structures in electricity, natural gas and petroleum sectors. As in other countries, energy efficiency along the supply-demand chain remains a priority, as well as the mitigation of GHG emissions from the energy sector. Equally, improvements have been made in the legislative and regulatory frameworks to improve the investment environment. Substantial steps have been taken towards creating a competitive and functioning market in the electricity sector, restructuring public institutions operating in the sector and implementing those market rules that will ensure the effective liberalization. A law on utilization of renewable energy sources for the purpose of generating electrical energy was passed and under this law a number of instruments have been introduced such as feed-in tariffs and purchase obligations, reduced license fees, connection priority and reduced fees related to project preparation and land acquisition. Since 2007, all these support mechanisms will be in force for the next ten years. A competitive electricity energy market which functions according to free market rules will be created. The transmission network will also be improved to allow for connection of the power generation facilities under construction or planned to reduce system losses. Furthermore, in order to improve Turkey's electricity import and export potential, new international transmission connections to neighbouring countries will be made and the capacity of the existing lines will be increased. Finally, there are investment opportunities related to the increased share of domestic resources in production of electricity energy, in domestic lignite and hard coal as well as in nuclear energy.

49. In the Questions and Answers session on a question from a delegate from e8 about the impact of the liberalised market on the attraction of new investors, a representative of Turkey responded that in particular hydro-power projects under development developed offered high returns to investors. The feed-in tariff of 5.5 €/kWh in renewable energy has also been instrumental for attracting investors. If Turkey would wish to support more expensive renewable technologies, for instance geothermal, the feed tariff might be adjusted upwards eventually. The Law of utilization of renewable energy sources will go to the Parliament in May 2011.

Session Seven: Case studies as the basis for developing pre-feasibility studies to attract foreign investment in power generation.

50. Detailed case studies on power generation investments were presented to assist country participants in advancing cleaner electricity generation and related fossil fuels-based energy project in each country. Case Study presentation and discussion included the lessons learned from projects implemented in the region.

51. This session was chaired by a delegate from Turkey. Concerning pre-feasibility studies, he reminded the meeting of four elements that needed to be addressed: technological process, financing, regulation, and policy. The pre-feasibility studies need to answer how uncertainties in these four elements could be reduced.

52. A representative of Electricité de France (EDF) presented EDF's experience in Poland concerning the EDF's development of a biomass generation plant. The Polish market provided an interesting aspect: that of green certificates. An energy company dealing with electricity production or electricity trading and selling this electricity to the final customers

connected to the grid in Poland is obliged to get and to submit the application to the President of Energy Regulatory Office (ERO) for redemption of the Green Certificates of Origin of the electricity from renewable energy sources (RES) Units or to pay a substitute fee. The required minimum share of RES-based electricity sold to the final customers by a given energy company is pre-determined and for example in 2010, it stood at 10.4%. Otherwise, a company can pay a substitute fee, where the unit substitute fee is fixed in the Energy Law and subject to yearly valorization by the inflation rate. Important to note is that this RES-E substitute fee is paid in addition to the price of the energy sold. Green certificates are obtained differently according to combustion technique and type of biomass used (wooden or agro-based). Burning biomass causes no CO₂ emissions according to the legislation and as such, allows for the reduction of cost of CO₂ emissions. In Poland biomass will remain crucial in the RES mix even up to 2030, in spite of the increasing developments in wind capacity. EDF's portfolio is mostly coal-fired and is facing new environmental challenges. Investment in biomass has helped address some of these problems.

53. There are opportunities firstly for co-combustion in existing boilers and secondly boilers can be replaced 100% with biomass. Biomass feeding can also be done through existing coal lines. EDF used these options in Poland. Further investments are being considered and some sustainability challenges remain. First a stable, long-term defined regulation concerning biomass definition is crucial. Also, the predictability of the RES incentives validity period will cause an increase of the number of the renewable projects and decrease the required price for green certificates to justify the investment. Biomass-based generation is competitive with the wind based generation since it is independent from weather conditions and thus being able to providing combined electricity and district heating generation with an economically competitive source of RES-E

54. In the Questions and Answers session the representative of Turkey questioned the potential of pits. The EDF delegate confirmed a great availability and indicated that it worked with farmers for securing the resource. However, he noted that its predictability as availability was impacted by the price movement of the crops. Another issue was possible existence of incentives to transport the biomass to the plant. EDF clarified that the global incentive was in the market value of the green certificate which was at about 60 Euros. The wholesale price being about 100 Euros/ MWh it means that the end-user price is subsidized by all consumers. Equally, the EdF representative mentioned that the boilers needed adaptation in some situations if biomass would be used: while a mix of biomass and coal of up to 15% can be used without any changes to the burner, a 40-45% biomass-coal mix will require an adaptation of the boilers. However, for a 50-50% mix, the burners needed to be transformed. There are also safety issues such as the risk of the explosion in the boilers. Finally, an interesting point on the logistics for such plants arised: while EDF had a subsidiary that supplies the coal to the plants, the biomass market in Poland was fragmented and there was a need for aggregation.

55. A delegate from Enel S.p.A. presented the lessons learned from the completion of the nuclear power plants EMO 3, 4 by Enel through Slovenské Elektárne (SE). As mentioned before, SE is the leading generation company in Slovakia with an installed capacity of close to 6,000 MW. The construction of units 3 and 4 of VVER-440 nuclear power plant in Mochovce ("EMO 3,4") had started in 1986 and suspended in 1992. The project was restarted in 2009 after Enel acquired SE. Approximately 30% of technology had been supplied and 70% of civil works has been already done. SE possesses considerable experience regarding VVER nuclear technology gained with the previous development, construction and operation of EMO 1, 2 and EBO 1,2,3,4 power plants. EMO 3, 4 will be ready for the power up-rate after the phase-in scheduled in 2012 and 2013. As of now, EMO 3, 4 represents the biggest private sector investment in Slovakia ever. The total investment cost of the project is 2.8 billion Euro. There were over 100 contracts that were signed for the completion of the project. The tailored multi-contract vendor solution helped mitigate risks.

Costs overrun and delay risks were covered in vendor contracts. Slovakia is a nuclear country with a well developed regulatory framework, established and working regulatory and nuclear oversight authorities and a positive perception of citizens. EMO 3, 4 is in compliance with the IAEA standards and has undergone all required international and local permitting and licensing procedures including EU commission inquiry. SE has been in a positive working relationship with all nuclear authorities and regulatory bodies. A nuclear project development in a well experienced country represents a considerable simplification and strongly supports a project's feasibility. The positive financial performance of SE made the financing of the project easier. SE successfully passed through the restructuring and cost reduction process after acquisition by Enel that enabled a flexible financing structure. In fact, operating cash flow is the key source of EMO 3, 4 financing. A multi-purpose loan facility, secured by corporate cash flow, supplemented required funds. No state or mother company guarantees has been required nor was project financing, as typically used for financing of energy projects based on conventional or renewable fuels in the region. Energy policy in Slovakia strongly supported EMO 3, 4 completion since it fostered energy independence and fuel diversification searched by the government. The robust liberalization process undergone by the Slovak energy market has also helped. It seemed that Slovakia represented a stable country with a relatively favourable tax regime, experienced workforce, steady developing infrastructure and law enforcement which also support energy project development.

56. In the Questions and Answers discussion the main issues were the capital and operating costs of different sources of electricity. Relatively high capital cost for the nuclear generation and large operational cost for the thermal generation were in focus although the recent projects in China have demonstrated that the nuclear plants could be built at relatively affordable cost including the costs of civil engineering. It was mentioned that selected renewable energy options could in fact be more expensive than nuclear, while both help with the CO₂ mitigation.

Concluding remarks on Fostering Investment in Electricity Generation in Central and Eastern Europe and Central Asia

57. A representative of the UNECE gave a brief summary of what had been discussed during the Forum. He highlighted the urgent need for a more efficient electricity sector and for more possibilities of interconnections. Finally, he reminded participants of the conclusions of the joint e-8, UNECE, EBRD and WEC Montreal High-level Dialogue attended by high-level government representatives from the region that attested their firm support of the joint initiative to foster investment in a cleaner electricity production in emerging economies. The representative thanked all the partners and sponsors of the initiative and of the Forum and invited the UNECE partner-organizations to deliver a brief concluding statement.

58. A representative of e8 expressed her pleasure in being associated with the UNECE, EBRD and WEC on this key initiative. She reminded participants of the discussions that took place during the Forum confirming that there was the need for the improvement of the regulatory and legal framework to attract certain types of investments. From the presentations it is clear that there is a positive attitude towards the region and that there are different types of financing options available to the countries concerned. The representative mentioned that understanding better the foreign private sector's point of view on investment would help the countries to attract the required funds. While there are foreign players willing to bring capital to the power sector, more importantly there is a considerable potential to develop and strengthen the local private sector as well. She asked participants to give their general feedback by filling out the participant survey found at their tables.

59. In his closing remarks, the Chairman-in-Charge of the meeting reminded participants that energy and electricity demand would be increasing. The governments will work to meet this growth but they need large investment for that purpose. He mentioned that International Climate Change Mitigation negotiations the following week in Cancun and in Durban in 2011 might provide legally binding obligations for governments to meet certain emission limits, possibly giving a new direction to the process and related industries. He thanked the delegates for attending and the sponsors for their excellent work.

60. The meeting:

Reiterated the importance of fostering investment in cleaner electricity generation in countries of Central and Eastern Europe and of Central Asia for their economic growth and social prosperity.

Again underlined the need for introduction of predictable and transparent regulatory framework for investment in cleaner electricity production in the region

As during the previous session in Montreal, the favourable and stable general investment climate in the countries concerned with suitable legal, tax and operational settings were seen as the major prerequisites for attracting very large investments needed very much for replacing outdated and inefficient power plants fleets as well as sustained economic growth

The investment case-study and country information, provided during the session, deepened the delegate's insight into the investment climate, issues and trends of each presented country.

The UNECE member-countries and corporations present expressed their gratitude to the secretariat of the United Nations Economic Commission for Europe, e8, European Bank for Reconstruction and Development and World Energy Council for the continuing valuable activity in promoting large investments required for the cleaner electricity production in Central and Eastern Europe and Central Asia

VII. Activities and priorities of the Committee on Sustainable Energy and any matters for consideration by the Ad Hoc Group of Experts (agenda item 6)

61. The secretariat provided an overview of recent activities within the programme of work of the Committee on Sustainable Energy (ECE/ENERGY/80) following its eighteenth session in November 2009, with particular emphasis on any decisions taken with regard to the work of the Ad Hoc Group of Experts.

VIII. Updates on the status of the United Nations Economic Commission for Europe project approved by the United Nations Development Account: 'Mitigating Climate Change through Attracting Foreign Direct Investment in Advance Fossil Fuels Technologies' (agenda item 7)

62. The United Nations Development Account (UNDA) in March 2010 approved the UNECE final project proposal entitled "Mitigating Climate Change through Attracting Foreign Direct Investment in Advance Fossil Fuels Technologies". The UNECE secretariat updated delegates on the status of the project, including the issuance of the full allotment (making all the funds for the project available) in June 2010 from the UNDA office and on

the status of the preparation the execution with the partner organisations: UNCTAD, UNDESA and ESCAP.

63. The delegates requested the secretariat to continue the preparation for the first meeting of the Advisory Board of the UNDA project, scheduled to take place on 21 January 2011 in Geneva (ECE/ENERGY/WP.3/GE.5/2011/1).

64. The Ad Hoc Group of Experts invited participating and other interested countries to attend the Advisory Board meeting on 21 January 2011.

IX. Programme of work 2010–2012 (agenda item 8)

65. In accordance with the UNECE reform adopted by member States in December 2005, the duration of the mandate for an Ad Hoc Group of Experts is a maximum of two years. The Ad Hoc Group of Experts had a two-year mandate set to expire by the end of 2010 approved by the Committee on Sustainable Energy at its seventeen session [ECE/ENERGY/78, para.20 (d)].

66. The Ad Hoc Group of Experts requested the Committee on Sustainable Energy to extend the mandate of the Ad Hoc Group of Experts for another two-year period of 2011–12.

67. The Ad Hoc Group of Experts also decided to extend its current programme of work for another two years (2011–2012).

X. Other business (agenda item 9)

68. The Ad Hoc Group of Experts requested the Committee on Sustainable Energy to rename it to: Group of Experts on Cleaner Electricity Production from Coal and Other Fossil Fuels.

69. In addition to its possible session in May 2011, the Ad Hoc Group of Experts decided to hold the November 2011 session on 14–15 November 2011.

70. Given the delay of more than two years in completing the staff structure of the UNECE secretariat responsible for the Ad Hoc Group of Experts and the considerable effort and resources which the Ad Hoc Group invested into the strategic partnership with e8, EBRD and WEC, Ad Hoc Group of Experts requested the UNECE secretariat to comply strictly with the instructions of the Ad Hoc Group of Experts on all cleaner electricity production-related activities and in particular not change anything in its operations including staffing without prior written approval of the UNECE member-countries as fully represented by Chairman and where need be by the Bureau.

71. The Group of Experts requested the secretariat to issue in the future as official documents in the three UNECE working languages all relevant documents for its work such as agendas, reports, programme or work, calendar for its meetings, questionnaires, terms of reference, progress reports and final reports of its ongoing activities, projects, studies and surveys as well as any other documents deemed important for the work of the Group of Experts, including all those considered during this session. In case of need, the secretariat should remain in close contact on this key matter with the Chairman and other members of the Bureau of the Group of Experts.

XI. Adoption of the report (agenda item 10)

72. Based on the Chairman's summary of the key conclusions and recommendations of the session, participants adopted the report of the meeting and asked the UNECE secretariat to issue it in the official form.
