Recent Inga studies offer new hope for Africa's energy security

A high level panel discussion took place during HYDRO 2011 in Prague based on the recently completed and approved prefeasibility studies for the Inga development in DRC. Various design options were presented for the staged development of a scheme which could eventually provide up to 42 000 MW of capacity for the African continent, including economic and technical aspects. The scheme will involve four 'energy highways' to transmit power to large areas of eastern, western and southern Africa, as well as meeting the rapidly increasing domestic and industrial energy requirements of DRC. The session ended with the Technical Advisor to DRC's Ministry of Energy inviting investors, either public or private, to participate in "this major project of the century".

Within a full-day track of sessions focusing on Africa during HYDRO 2011 in Prague, one of the important highlights, on the morning of 18 October, was a panel discussion entitled 'Inga, the Potential Powerhouse of Africa'. This took place just a few days after a major milestone in the development of the scheme, when recently completed prefeasibility studies, conducted by a partnership of AECOM (Canada) and EDF (France) had been reviewed and approved in Kinshasa.

The session was chaired by ICOLD Secretary-General, Michel de Vivo. Panellists were Albert Mbafumoya-Tchomba, Technical Advisor to the Ministry of Energy of DRC, Stéphane St Pierre, Vice President of Hydro Africa at AECOM, Pierre Lorillou, Deputy Project Manager for Inga at EDF, Arnaud Rousselin, Civil Works Project Engineer at EDF, Rheaume Veilleux, Project Manager for Energy Transmission and Distribution at AECOM, and François Lempérière, Director of Hydro Coop (France) who has provided technical support for the Inga studies for EDF.

De Vivo, in his opening remarks, described Inga as "the African dream", which has provided so much hope for the continent. This project, he continued, which had been studied and discussed for at least 50 years, would eventually be able to supply more than 40 000 MW (making it much larger than Three Gorges), and would be able to supply nations as geographically distant as Egypt in the north, and South Africa in the south. About 500 million households in Africa could be supplied with electricity, he said. He noted that a number of problems had blocked the project in the past, including the cost, the long power transmission lines which would be involved, some political problems, the uncertainty about power offtakers, and financial institutions which were formerly not always ready to support hydro.

In the 1970s and 1980s, first steps for the development of Inga's potential had been taken, with the construction of Inga I and II, but today only about 40 per cent of their capacity was available, because of some operational and maintenance issues (now being addressed with a World Bank-funded refurbishment scheme).

Above left: Albert Mbafumoya-Tchomba, Technical Advisor to the Ministry of Energy, DRC. He invited potential investors to "become involved in the project of the century".

Above: ICOLD Secretaary-General Michel de Vivo, who chaired the session on Inga.

The discussions of the panel, De Vivo said, would focus on the parallel studies under way for Inga 3 and for the staged development of Grand Inga.

DRC's electricity sector and the future role of Inga

A. Mbafumoya-Tchomba began discussions by giving delegates an outline of the electricity sector in his country, and a brief overview of the plans for Inga. The country's hydro potential totals 100 GW, he said, with 44 GW at the Inga site. The present electrification rate, however, was only 9 per cent (or 6.5 million of the population of 72 million).

Another constraint for the sector was that only 1200 MW of the total capacity of 2500 MW at Inga I and II was currently available, because of obsolete equipment and a lack of adequate maintenance. A power deficit of at least 1000 MW could be expected by 2015, he continued, based on public requirements and industrial demand from the mining company Katanga. The country had also historically suffered from a lack of financial resources and limited capacity to mobilize and manage large amounts of funding, as well as inadequate institutional and legal frameworks.

Mbafumoya-Tchomba commented that electricity sector reform was now planned, including the introduction of an Electricity By-law, which was currently under review by Parliament, and was to be enacted by the President shortly. Other imminent innovations were the appointment of a Independent Energy Board, to oversee operators and to arbitrate between operators

Photo left: General view of the panel.

Pierre Lorillou of EDF, who focused in his talk on the future power demand of DRC, and of the various African power pools to which power could be exported from Inga.

and consumers, and a new legal framework for power assets.

Inga 3 construction

Mbafumoya-Tchomba then reviewed progress on Inga 3, which was to be developed as a public-private partnership (PPP). Following a call for expressions of interest in 2010, six groups had been pre-selected in April 2011. An MoU about the project was sent to them in May, requesting proposals based on a design of the scheme involving tunnels as the water conveyance system; in August, an addendum was sent to the potential developers concerning an alternative solution, involving an open channel. Proposals were received from three pre-selected groups in August, and on 10 October a legal counsel was appointed to advise the DRC Government (GDRC) in the selection of the developer, with support from the African Development Bank. Proposals had been reviewed in a public meeting on 15 October.

The next steps would be to select the developer, based also on the advice of an expert commission from the African Union Commission, and to negotiate an agreement. An autonomous company would then be created, which would be called Inga 3 Project Development Company; the selected developer is to be a majority shareholder, and the company would also include other investors and GDRC.

Technical, financial and legal support was expected from international financing institutions, and agreements would be made with potential power purchases, one of which is to be BHP Billiton.

Grand Inga

Mbafumoya-Tchomba explained that GDRC was also firmly committed to the development of Grand Inga, and was confident that this could be implemented in parallel. This major project is also to be developed as a PPP, with an eventual planned capacity of at least 39 000 MW.

Studies to confirm the optimal development of the available potential at Inga were being financed by the African Development Bank, at a cost of US$14.5 million. A contract had been signed with AECOM (RSW) of Canada with EDF (France) in December 2010 for the following services:

- preliminary study of demand and production capacity;
- prefeasibility study of Grand Inga;
- environmental and social impact studies; and,
- preparation of an intermediate report on project structuring and financing.

At a meeting in Kinshasa between 12 and 14 October 2011, the report was approved by DRC's Ministry of Energy.

The panel validated, in October, the open channel option for the scheme, without river closure, as the first developmental phase of Grand Inga.

Mbafumoya-Tchomba concluded that, as well as providing clean, abundant, reliable and cheap energy to boost development in DRC and throughout Africa, the scheme would help to reduce the impacts of climate change, reduce poverty and reinforce regional economic development.

Staged development of Grand Inga

A joint presentation was then given by P. Lorillou (EDF) and S. St Pierre (AECOM).

Lorillou explained that the terms of reference of the Consortium had been to propose an optimal strategy for developing the Inga site, to analyse the available existing studies on Inga 3 and Grand Inga, and to compare Inga 3, Grand Inga and a regional project (Beko Abo). The studies will eventually lead to the compilation of six volumes:

- Supply and Demand Study
- Prefeasibility Study
- Feasibility Study
- Environmental and Social Impact Study
- Structuring and Financing Study
- Communication and Public Awareness.

He underlined the broad range of topics covered by the study. The present talk, he said, would focus on the work already completed (on supply and demand, and the prefeasibility report).

Regarding the market for power from Inga, he said this fell into three categories:

- industrial demand (a major customer being BHP Billiton, producing aluminium, and the Katanga mining company);
- commitment for high voltage exports; and,
- public demand (domestic) for which there were three scenarios depending on development of the national grid.

Taking into account also the projected population increase and future industrial demand, Lorillou said that the total increase in demand forecast by 2030 was 6000 MW.

Some power production increases would be made possible by the rehabilitation of Inga I and II, but nevertheless, according to the power balance analysis, demand to be covered by the new Inga development would be around 1500 MW by 2020 and about 3000 MW by 2030.

Turning to the possibilities for future major power consumers, Lorillou explained that the studies had taken into account the power pools of western, eastern and southern Africa (encompassing some countries likely to be major consumers, such as Nigeria, Egypt and South Africa (these three representing nearly 80 per cent of the demand within their respective power pools). The hypothesis (based on experience of the major consumers in the region, and other countries worldwide) was that countries would be ready to take about 5 per cent of their demand from a single project outside their own country. If confidence was then created, this could possibly increase to 10 per cent.

Looking at projected demand of the three major con-

Stéphane St Pierre of AECOM, who described the phases of proposed staged development of Inga 3 and Grand Inga.

sumers, and applying the 5 per cent hypothesis, it was estimated that 3500 MW would be consumed by Egypt, the same amount by South Africa, and 1300 MW by Nigeria.

Adding to this the internal demand of DRC and the requirements of BHP Billiton (totalling 3000 MW by 2020) it was clear that the demand for Inga was there, Lorillou said, with at least 5000 MW being required by 2030 (1500 MW for DRC and 3500-5000 MW for export).

It was expected, he added, that once the first "international step" had been taken, then the confidence would increase among other investors, and demand from Inga would increase.

Lorillou concluded his part of the talk by recalling that the current studies were looking at the Inga site as a whole, with an integrated view of Inga 3 and Grand Inga, and the aim was to find optimal solutions for both DRC and the offtakers.

Previous studies had led to solutions which would have involved very high initial investments in civil works, so the present studies were focusing on a staged development, to reduce the costs at the outset. The emphasis was also on having flexibility to respond quickly to increases in demand, and to reduce risk.

In his part of the presentation, S. St Pierre began with some reflections on the huge scale of the Inga development, recalling that the Congo river was the second largest river in the world, with its watershed ($3.7 \times 10^6 km^2$) in both hemispheres, and year-round rainfall. Mean average flow of the river, he continued, was 41 000 m^3/s. An advantage, he pointed out, was that there was a relatively small variation in flow throughout the year (based on about 100 years of hydrological records), making the site ideal for a run-of-river development. For the capacity of 39 000 MW, 52 generating units would be involved with a unit capacity of 750 MW.

The natural head available on the river is 100 m, he said, and the addition of a dam, planned for one of the later phases, would increase this to 150 m.

St Pierre then reviewed the various layout which had initially been considered for Inga 3, mostly involving tunnels, and a few canals, with the objective being to avoid river closure.

He presented an option which had been considered for Inga 3, which involved about 16 tunnels, around 13 m in diameter, with a total length of 50-70 km.

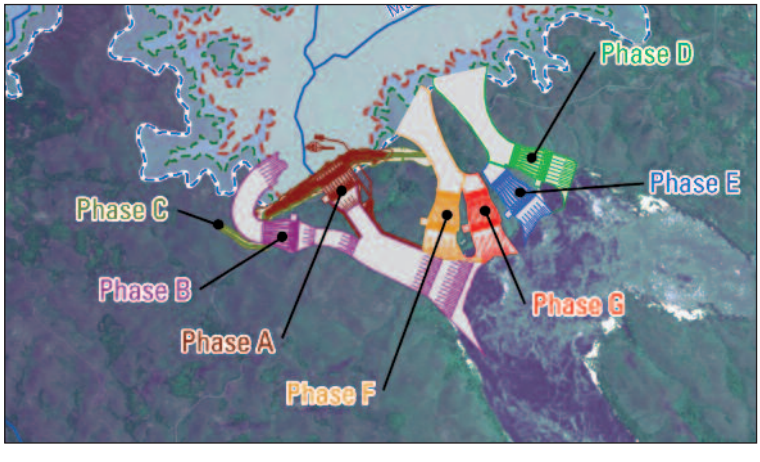
He then referred to the difficulties of such large-scale tunnels, with the associated risk of substantial underground works. There would also be risks associated with cost overruns and delays. However, he concluded that Inga 3 could be implemented based on the tunnel option (possibly used an enclosed TBM, extensive rock support, and a low planned progress rate, to minimize risk). In this case, the construction schedule could be around 15 years. St Pierre mentioned, however, that there were concerns that the site would not be developed in the optimum way, on this basis.

Efforts had therefore been made to develop more innovative, flexible and economic solutions.

He then illustrated the various scenarios which are envisaged for the staged development (pointing out that some have alternative solutions in case power demand does not increase as foreseen). These can be briefly summarized as:

- *Phase A*: To avoid river closure, a transfer canal would be built, to the Bundi valley. An RCC dam (Bundi) would be built, which could be heightened in Phase C, and a 3700 MW (maximum) powerhouse. Headpond levels would be 145-170 m.
- *Phase B*: A 3500 MW powerhouse could be built. This phase would be necessary to meet DRC demand (and could follow demand more closely), only in the event that international demand does not go as planned. The headpond levels would remain the same as Phase A, and the units could be designed to operate at two different heads.
- *Phase C*: this would involve river closure, and the construction of a dam with two spillways. There would not be new powerhouses, but a 50 per cent higher head would be provided by heightening of the Bundi dam. An outlet would be constructed to feed Inga I and II. Capacity would be between 5700 and 11 400 MW. The Phase C water level could be 202-205 m (environmental aspects are under study for this).
- *Phase D*: The headpond levels remain the same. A new headrace and a 7400 MW powerhouse would be built. The total capacity could be 13 100 - 18 800 MW.
- *Phase E*: The headpond levels remain the same. A new headrace and 7400 MW powerhouse would be built, making a total of up to 27 000 MW.
- *Phase F*: The headpond levels remain the same. Another new headrace and 7400 MW powerhouse would be built, bringing the total to up to 34 000 MW.
- *Phase G*: The headpond levels remain the same. Construction of a new headrace and 7300 MW powerhouse are foreseen, reaching the total of 42 000 MW.

Fig. 1 shows the potential final layout, assuming these phases are implemented. St Pierre stressed the importance of the multiple scenarios which had been studied, to adapt to different demand projections.



Layout of the various proposed phases of the Inga development, which could be progressively implemented, depending on demand increased both in DRC and other offtakers in the region. From the joint paper of AECOM and EDF.

Mean annual production, he said, when all phases are complete, could be 331 663 GWh. He commented that this could be compared with production of 227 800 GWh from all the powerplants in Québec in 2009, with a total installed capacity of 40 000 MW.

Summing up the benefits of the staged development, St Pierre mentioned that this would allow for a rapid start to the development, and also it would provide flexibility to adapt to the demand patterns of DRC and other countries in the region. The scheme would also provide optimized generation costs at each stage, by levelling investments over time, and allow for multiple private operators to share the site. Phase A (the Inga 3 canal option) could move ahead around five years earlier compared with previous plans.

One of the main challenges foreseen concerns the important need to anticipate future interfaces between the Phases, as the powerhouses will each have different operators, and different PPPs, while there will be common works, such as the dam and spillways, which have to be operated for the common good.

Multi-criteria analysis

Pierre Lorillou gave details of the analysis of options which had been studied. He recalled the assessments of demand for DRC (domestic and industrial) up to 2020 and for DRC and exports by 2030, and presented the two scenarios for development, as studied. He commented that DRC was today at a crossroads, needing to decide whether to select the Inga 3 scheme with tunnels, which could take 12-15 years, followed by the first phase of Grand Inga, which would take 10-12 years. The alternative, preferred by the Consortium, would be to start with Phase A, meaning Inga 3 with a canal and beginning with Bundi dam, then to heighten Bundi dam in Phase C, and start part of phase D.

The two scenarios are summarized in Fig. 2, which gives the anticipated construction times, and costs per MWh for the two steps in each case.

As can be seen, the time delays are shorter, costs lower, and risks better managed in the case of scenario 2, which led the Consortium to recommend this option. It is also considered that Scenario 2 will offer better opportunities for local employment, and the lessons learned during this step would lead to greater acceptability for Grand Inga.

Environmental aspects are not anticipated to be less favourable for Scenario 2, particularly as the area to be flooded is relatively small. Resettlement is not an issue in the area of Bundi dam. The project thus compares extremely well with other major schemes in the world, as regards the area to be flooded and people to be resettled per MW installed.

Lorillou said that a second major recommendation of the Consortium was to set up a development and promotion agency, or Inga Authority, with anticipated responsibilities as follows:

- to facilitate competitive dialogue with developers, and to select candidates;
- to endorse and lead the global vision for development of the site, and to continue the preparation of Grand Inga in phases;
- to facilitate dialogue with interested countries and power pools;
- to coordinate activities and planning for the transmission and distribution lines;
- to pilot the interfaces between the shared infrastructures (Bundi dam and associated works) and dedicated ones; and,
- to stand as main stakeholders for the special purpose vehicles (for financing).

He added that it was considered urgent to implement this Authority.

Lorillou reiterated in conclusion that the power market for Inga clearly exists, and he stressed that the Phase A solution, as a less risky and more profitable option for DRC, and for future generations, could move ahead rapidly. He stressed the strong commitment of the GDRC to move ahead, after 30 years during which no progress was made, and added that it was important not to break the existing dynamic and political willingness.

Discussion

Adama Nombre of Burkina Faso commented on the rate at which demand was increasing across Africa. In some West African countries, he said, there had even been riots concerning inadequate supplies of electricity. The Inga schemes planned would offer a unique opportunity to provide cheap energy for the development of Africa.

He felt that another very major benefit of the project would be improved cooperation between the African countries.

Alessandro Palmieri (World Bank) expressed his congratulations on the way the Inga development was being planned, in particular the fact that it was a staged development. He asked Mbafumoya-Tchomba, in light of the plan to export energy to neighbours, whether consideration had been given to the idea of forming an observation board, so that the neighbouring countries could be regularly informed about how the project was developing. He felt this could go a long way towards building confidence and creating a market.

Mbafumoya-Tchomba replied that in the study currently being carried out by the consortium, there was a process which involved the other countries which were interested in interconnections and transmission lines. All the countries involved were to be invited to the next meeting in Kinshasa. He added that it was very important for GDRC to be fully aware of the needs of all the countries, and to work together with them. The 5th Volume of the report being prepared would cover such aspects, as well as governance, and the Inga Authority. He added that interested countries should take part in the governance, and be included in the process.

Y. Agrawal of Sequoia Scientific, USA, commented that this project provided a valuable opportunity to collect long-term data on sediment. He observed that often very sparse data were used when dams were

	Scenario 1	Scenario 2
DRC + industries 3000 MW **2020**	**Inga 3 - tunnels** 3000 MW 41 US$/MWh - 12-15 years *Risks: cost overruns and delays*	**Phase A = Inga 3 - canal** 3000 MW 33 US$/MWh - 7 years *Better risk management on costs and delays + better opportunities for local employment*
DRC + export 1500 + 3500 = 5000 MW **2030**	**Grand Inga - 1st phase** 5000 MW 34 US$/MWh - 10-12 years *Restitutions to Inga 1, 2 & 3 sub-optimal*	**Phase C&D** 5000 MW (C:2000 + D:3000) 18 US$/MWh - 7 years *Better acceptability*

Fig. 2. The two main scenarios considered for moving the Inga scheme forward, showing the reasons why the second was recommended by the AECOM-EDF Consortium.

designed. In this case, a database could be developed at the outset, which could lead to a good prediction of the operating life of the reservoir,

It was agreed that sedimentation was an important issue, in view of the huge river discharge involved, and the large sediment loads. This had been clearly demonstrated at Inga I and II.

S. Bakayoko of Côte d'Ivoire endorsed the view that Inga is a great project, which all African countries are waiting for. But he queried whether political stability in the region could be an issue.

Mbafumoya-Tchomba commented that between 1996 and 2004, in times of civil unrest and even war, power exports to South Africa had continued without interruption. He felt that issues of energy could remain unaffected even by a situation as serious as a war.

Safe closure of the Congo river

A paper by A. Rousselin of EDF and F. Lempérière of Hydro Coop, France, set out the safe solutions which have been planned for closure of the Congo river.

This closure is considered to be challenging, he said, as the flow to be diverted is around 50 000 m^3/s, which is much more than that of most rivers which have been closed in the past (around 10 000 m^3/s). The Congo river is also very deep at this location (in the range of 85 m) which is about twice the maximum for previous closures.

However, at the location of the dam, Rousselin continued, there are some favourable conditions: the natural flow velocity ranges from 2.5 to 4 m/s, which is comparable with velocities in many large rivers of the world. Also, large quantities of materials will have been gained from the excavation works of previous phases (around $38 \times 10^6 m^3$).

Another beneficial feature is an island in the river at the location of the dam, which provides a large surface for the construction of a large diversion structure on the right bank, spillway no. 1, and to erect a closure dam with several parallel dykes (key fact for the safety of the closure).

Rousselin reminded delegates that prior to 1960, closures had generally been carried out by horizontal tipping, using bridges or cable cranes. Since 1960, multiple vertical closures had been done, where end tipping was done using large rear dumpers.

He pointed out that if two or three parallel dykes were used, moving forward simultaneously from a river bank, this would allow for a reduction in the size of the materials, which became very relevant when millions of cubic metres were required.

The original study for Inga in 1974 had considered a vertical closure, using a main rockfill dyke, separating into two dykes for the final closure. The river would then be diverted through 17 gates.

The present Consortium had reviewed the previous study and proposed a number of improvements.

Rather than using one closure dyke made of heavy blocks, the new design is based on the construction of three parallel closure dykes, 300 m apart, for which the materials excavated from adjacent structures can be used. The unit weight of the materials used can safely be reduced, because by using three structures, the total water head is divided by three (from 8-9 m, to 2-3 m maximum, which is quite normal for a large river).

Rousselin presented the calculated weights and volumes of material necessary for closure, corresponding to flow rates of the Congo of 30 000 m^3/s, 45 000 m^3/s and 60 000 m^3/s.

Above left: A. Rousselin of EDF, who presented the plans for river closure.

Above, F. Lempérière, who gave technical support to the concept. He stressed the exceptional safety margin of the concept, and the advantage of being able to achieve closure of the Congo river at any time of the year using this method.

The capacity of the diversion structures have been increased as much as possible, he said, so as to reduce the flow velocity at the end of each dyke.

The closure would be in three phases, Rousselin continued; the first step would be to fill the deepest part of river, which would take eight months for about $7 \times 10^6 m^3$. Then the flow velocity would increase progressively, but it would still be possible to use unselected rock until the last 50 m, when the flow would become critical. It would then be necessary to use 200 000 m^3 of heavy material for the final closure, he explained.

After completion of closure, backfilling would be done between the upstream and central dyke, he said, retaining some filters, and forming a watertight wall, with the addition of a foundation grout curtain.

Main improvements compared with the 1974 design, Rousselin said, were improved safety and stability, as a result of the increase in the dam base width. Improved slope protection would be added using riprap on the dam, along the upstream and downstream faces.

F. Lempérière added some comments, first of all stressing that the choice of closure solution was based first on safety, rather than cost savings. A solution could have been chosen to save around $50 million, he said, but in fact this would have meant only a small reduction eventually in the cost per kWh for the scheme.

He summarized the three main advantage of the solution as:

- a very great margin of safety;
- a cross section of the final dams which would be much larger than a traditional case (so even if some settlement occurred, the safety of the final dam would be exceptional); and,
- the solution proposed means that closure can be done at any time of year, and even the final stage could take place during months of high discharge.

This last point, Lempérière said, was exceptional for a dam in such a large river. Usually the overall schedule of works would be linked to the seasons of the river. Closure generally has to be achieved within a few months of the dry season only. In these cases, even a small delay in schedule can lead to an overall delay of a whole year, with associated increased costs. In the case of the proposed closure of the Congo, the decision to proceed and schedule of works can be independent of the seasons. Thus, this very challenging closure will be expensive, but exceptionally safe and very flexible for the overall schedule of works.

R. Veilleux of AECOM, who described the proposed power highways to transmit power from Inga across the African continent.

The energy highways

R. Veilleux of AECOM presented information from the prefeasibility report on the plans for the network, substations and transmission lines from Inga.

As background, he noted that the African continent is served by five power pools. The transmission grid carries large loads (>11 000 MW) over exceptionally long distances (>5500 km) across 16 nations.

He then described the four large 'power highways' which were proposed to carry power from Inga:

- Inga to South Africa would involve two, the 3450 km-long Western Corridor, and 3757 km-long Eastern Corridor, to carry a total of 3500 MW;
- Inga to Egypt, which would be a 5351 km-long line for 3500 MW; and,
- Inga-Nigeria, with a 1669 km-long line for 1300 MW.

There would also be a 1774 km-long line to Kolwezi, within DRC, and a relatively short line (400 km) to Luanda in Angola.

The issue of using AC or DC technology had been studied, Veilleux continued, and he pointed out that DC was appropriate for very long lines, as reactive compensation was required on AC lines. Various transmission voltage levels had been considered, he said, and ± 600 kV had been selected for South Africa and Egypt, and ± 500 kV for Nigeria.

He summarized the main design criteria for the transmission network as:

- service continuity, with N-1 redundancy;
- power losses to be within a range of 10 per cent; and,
- series compensation, within a 70 per cent range (AC) for the very long lines, to avoid stability problems.

He showed details of the planned substations and lines; the costs for the transmission lines would total US$11.6 billion, he said, and the cost of the substations would be around US$3 billion.

In conclusion, Veilleux recommended that at the feasibility phase, there should be detailed analysis of:

- the maximum transmission capacity requirements;
- the tapping points (for energy in and out);
- expected system reliability (N-1 or N-2);
- the number of lines (1 or 2) along each corridor (bearing in mind the need for security); and
- the converter overload capability.

Discussion

J. Teyssieux, of Tractebel Engineering, France, asked whether model studies were foreseen within the framework of the studies. Rousselin replied that hydraulic modelling had been done at Sogréah for the study in the 1970s, which were considered adequate, and so it was not considered necessary to construct a new model, particularly as the current design is safer than the one proposed in the 1970s.

J. Kenfack of Cameroon commented that his country had been in discussion concerning power trading with Chad, and was now surprised that no power line from Inga seemed to be envisaged to pass through central African countries such as Chad.

Veilleux explained that consideration had been given to the highway to Nigeria passing through Cameroon, but this had not been considered economically feasible because the distance was longer than the other options. Also it was clear that Cameroon had substantial hydro resources internally. But he added that eventually there could be a tap-in at Memvele in Cameroon.

Sultan Alam of France asked about the final closure of the diversion structures. At Itaipu, he said, this had been a challenge, as it had been necessary to close all gates at once. He asked how this was planned to be done at Inga.

Pierre Lorillou replied that the situation would be different, in that four gates would be closed one by one on spillway no. 1, and then spillway 2 would be used for final closure.

Conclusion

A. Mbafumoya-Tchomba said, in conclusion, that a major objective of his government today was the promotion of Grand Inga and the associated transmission highway. In the name of the Ministry of Energy of DRC he invited investors, either public or private, to participate in this century's most important project as a mutually beneficial partnership.

He also welcomed interested parties to take part in the next Inga panel in Kinshasa, between June and September 2012.

He expressed the hope that members of SADAC and WAPP, especially Nigeria and South Africa, would express firmly their interest in taking power from Inga through priority transmission access.

In summing up the session, Michel de Vivo commented that the various technical options for Inga which had been presented clearly demonstrated that Inga was no longer still just a dream, but a realistic opportunity to meet the demand of the African countries, and to boost development in Africa.

He added that the final solution had not been chosen yet, but the Government of DRC showed a real willingness and dynamism to go forward. Whichever technical solution was chosen, it would be essential to keep this strong dynamism, he concluded. ◊