

Haití - Estudio de Factibilidad
Proyecto Hidroeléctrico "La Chapelle"

Aspectos financieros

De la lectura de la información contenida en el Capítulo 16 del primer tomo del estudio presentado por la firma consultora, surgen algunos aspectos que requerirían su revisión. Así entonces,

- a) Con respecto al cálculo de la base tarifaria para la determinación de niveles de rentabilidad se considera conveniente incluir en dicha base una estimación de capital de trabajo. A tal efecto el Banco en sus guías para la formulación de solicitudes de préstamo de energía eléctrica recomienda la inclusión de un capital de trabajo promedio para cada año, indicando que el mismo estará constituido por una suma razonable de recursos comprometidos por la empresa en la explotación de los servicios ("stock" adecuado de materiales en almacén y gastos corrientes dentro del ciclo de recaudación).
- b) Se aprecia que en el procedimiento de cálculo del índice de cobertura del servicio de la deuda se omite considerar los gastos financieros cargados a la construcción. De esta forma el índice resultante en el estudio practicado resulta superior al que correspondería si se efectuara el ajuste propuesto.
- c) Para la realización del análisis de la información contable histórica de la EDH no se ha considerado la preparación de estados de origen y aplicación de fondos. Se considera que estos estados pueden aportar importantes elementos de juicio en la evaluación histórica de la gestión empresarial así como establecer una base adecuada para la formulación de las proyecciones financieras.
- d) El procedimiento utilizado para calcular el servicio de la deuda del préstamo internacional destinado a financiar el proyecto no se adecúa a las condiciones establecidas por el Banco en esa materia. Así por ejemplo, se consideró que el período de gracia era aplicable tanto a intereses como principal, cuando en realidad sólo corresponde a la amortización. El servicio de la deuda -intereses más amortización se consideró como una suma fija durante el período de devolución del préstamo cuando en realidad solamente correspondería dejar fijas las cuotas de amortización. Asimismo se estima que la tasa de interés utilizada ha quedado desactualizada en relación con las actualmente aplicadas por el BID. No obstante no se aprecia que una modificación de ésta última puede afectar significativamente las conclusiones de los consultores. Finalmente cabe indicar que no se ha considerado en las proyecciones financieras la incidencia del gasto financiero en concepto de Fondo de Inspección y Vigilancia.
- e) Asimismo, correspondería calcular nuevamente el costo del proyecto para registrar adecuadamente la incidencia que tendrían los costos financieros durante la etapa de construcción.

- f) Por último corresponde señalar que sin perjuicio de las observaciones indicadas precedentemente, no resulta factible abrir opinión sobre la factibilidad financiera del proyecto en razón de que se carece de elementos de juicio sobre los datos de base utilizados en la preparación de la proyección. Así por ejemplo correspondería conocer si las cifras de ventas estimadas conciben con el crecimiento esperado de la demanda, o si el costo determinado del proyecto se ajusta al criterio técnico sustentado por el Banco. Asimismo cabe indicar que los criterios utilizados en la preparación de las proyecciones financieras no se ajustan a los requerimientos del Banco, lo que limita aún mas la posibilidad de abrir juicio sobre las cifras presentadas.

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HAITI - La Chapelle Hydroelectric Project

Feasibility Study

The consultants Shawinigan-Ginter have completed the final version of a feasibility study for the above project, dated October 21, 1983. The major conclusion of the study is that a new feasibility study should be done for a different variant of the proposed La Chapelle project. This new variant would be located about 18 km. from the site originally studied, and would involve the construction of a 10 km. canal. The result of this change would be to increase the installed capacity of the plant by 22.6 MW (from 34 MW to 56.6 MW), and reduce unit costs of construction from US \$2,747/kW to US \$2,370/kW ^{1/}. Furthermore, the revised project would avoid the flooding of 885 ha. of productive farmland, would require the relocation of fewer people, and would provide additional benefits (including the possibility of irrigating land adjoining the canal).

Although the feasibility study itself covers only the original 34 MW project, the rationale behind the consultants' proposal is that: (i) their feasibility study shows the 34 MW project to be economically justified, and (ii) the 56 MW variant seems to be more economic than the original 34 MW proposal. While the logic behind the proposal seems fairly straightforward, it should be observed that the study of the 34 MW variant ~~is~~ based on some questionable

^{1/} In terms of energy, these costs amount to about 8.3¢/KWh and 7.7¢/KWh, respectively.

assumptions ^{1/}. Among the assumptions used in the analysis are the following:

1. That gross generation requirements will grow by 8-10% p.a., reaching 613 GWh (123 MW peak) by 1989, and 1695 GWh (340 MW peak) by the year 2000,
2. That the Guayamouc hydroelectric project (22MW) will only be built after La Chapelle since it has higher unit costs of construction, and
3. That fuel prices by 1989 will reach the following levels (in 1982 US \$):
Bunker C - \$36.75/bbl.
Diesel - \$48.25/bbl.
Coal - \$80.41/ton.

In fact, however, these assumptions seem doubtful. Demand projections, for example, are based on projections made by the consultants HQI-LGL-LMBDS in September 1982. However, HQI-LGL-LMBDS subsequently (Feb. 1983) reduced those projections to reflect (i) lower expected growth rates of GNP (3% p.a. rather than 3.6% p.a.) ^{2/}, (ii) improvements in the distribution system and

^{1/} Even under those assumptions, the project is barely justified. Postponing the project from 1989 to 1992, for example, would raise the present value of the country's long term expansion plan by only \$600,000; this represents 0.6% of the investment costs of the project and 0.2% of total expansion plan costs. Total expansion plan costs "with" the 34 MW La Chapelle project are estimated at \$261.0 million, while the costs of the expansion plan "without" the La Chapelle project are estimated at \$268.6 million; the difference of \$7.6 million represents about 3% of total expansion plan costs.

^{2/} By way of comparison the Bank's projections show a gradual rise in GNP growth from about 1% in 1983, to about 3.4% in 1986.

anti-theft measures to reduce losses, and (iii) compensatory factors which will serve to keep the load factor constant rather than decline over time as originally projected. As a result of the above, HQI-LGL-LMBDS now expect sales to be 7% lower than originally projected by 1990, gross production requirements to be 17% lower, and peak load to be about 22% lower ^{1/}. Inasmuch as Shawinigan indicated their agreement with the methodology employed by HQI-LGL-LMBDS ^{2/}, it would seem that the demand projections used in the La Chapelle feasibility study should also be revised.

Concerning the Guayamouc project, the analysis performed by HQI-LGL-LMBDS shows that while that project is not justified for inclusion in the expansion plan if only electric sector benefits are considered, it is justified if other benefits (a reduction in the decline of agricultural production in the Artibonite plain) ^{3/} are taken into account. Thus, while the justification of the Guayamouc project may itself be weak ^{4/}, Shawinigan would have to provide more convincing evidence that the Guayamouc project should not be undertaken. The final version of the feasibility study for the revised Guayamouc project is expected to be completed next month (March, 1984), which should shed some light on this matter.

- ^{1/} Revised demand projections for 1989 indicate gross production requirements of 531 GWh and a peak load of 99.3 MW. The figures for the year 2000 are 1462 GWh and 278 MW, respectively.
- ^{2/} In fact, Shawinigan's own demand projections essentially followed the same methodology used by HQI, and gave nearly identical (though slightly lower) results
- ^{3/} The report prepared by HQI does not include sufficient documentation to confirm their estimate of agricultural benefits.
- ^{4/} The expansion plan prepared by HQI-LGL-LMBDS shows that the present value of the expansion plan with Guayamouc is \$2.2 million (0.8%) less than an expansion plan with a coal fired alternative, assuming relatively high costs of fuel and including agricultural benefits.

↑
Max. min.

As far as fuel prices are concerned, Shawinigan-Ginter base their estimates on the 1982 prices cited (and used) by HQI in their expansion plan study; these are as follows:

<u>Fuel type</u>	<u>Base price Port-au-Prince (1982 US \$)</u>
Bunker C	\$32/bbl.
Diesel	\$42/bbl.
Coal	\$70/ton

Shawinigan then assumes that these prices will rise by 2% p.a. in real terms, reaching \$36.75/bbl. for Bunker C, \$48.25/bbl. for diesel, and \$80.41/ton for coal by 1989.

HQI's initial price estimates seem to be too high, however, and this discrepancy becomes even more accentuated over time under the assumed 2% (real) annual increase in prices. Based on: (i) current Bank projections for crude petroleum prices in 1990, (ii) Bank estimates of transport costs for petroleum products between Caribbean refineries and Haiti ^{1/}, and (iii) HQI's estimated differential between prices of crude oil and petroleum products in the Caribbean ^{2/}, a more realistic estimate of prices of Bunker C and diesel oil in Haiti by 1989 might be on the order of \$25/bbl. for Bunker and \$37/bbl. for diesel ^{3/}. In the case of coal, f.o.b. contract prices in Norfolk are currently about \$52 per ton and transport costs to Haiti are estimated at.

1/ About \$5 per ton, or less than one dollar per bbl.

2/ 20% discount for Bunker C, 20% premium for diesel.

3/ This is under the Bank's basic scenario concerning petroleum prices; under the "high" scenario, prices would be about \$28/bbl and \$42/bbl, respectively.

about \$8-10 per ton, yielding a total cost of about \$60-62 per ton; coal prices are not expected to increase significantly between now and 1989. It should be noted that these estimates are in line with the price estimates made by Bechtel for the Jamaica Coal conversion project ^{1/}.

A rough estimate (based on Bechtel's prices) of the impact of lower fuel costs on the calculations made by Shawinigan-Ginter, shows that the differential between expansion plan costs "with" and "without" La Chapelle would be reduced by over \$10 million (in discounted terms). In other words, the "savings" due to La Chapelle would be reduced by \$10 million, which is higher than the currently expected net benefit of the project (\$7.6 million); under these circumstances the La Chapelle project would not be justified.

On another note, there is no indication in the Shawinigan-Ginter document that shadow prices were considered in the analysis -- in particular the opportunity cost of unskilled labor. This could be an important element in determining the true economic cost of hydroelectric projects in a country such as Haiti, and should (in principle) favor hydro projects over thermal alternatives.

Conclusions

Contrary to the conclusion reached by Shawinigan-Ginter, it is not immediately apparent from the feasibility study that the 34 MW version of the La Chapelle project is economically justified, and particularly not for construction by

^{1/} According to the Bechtel study, C.I.F. prices to Old Harbor Jamaica are currently \$28.47/bbl. for crude petroleum and \$58.08/ton for coal; these prices are assumed to remain firm through 1985.

1989. On the other hand, it does seem likely that the 56 MW variant is a better project, and thus may be economically justified even if the 34 MW version is not. Thus, while in retrospect one can probably say that the feasibility study prepared by Shawinigan covered the wrong project, the results of the studies prepared by Shawinigan and HQI do not permit a conclusion to be drawn about whether the 56.6 MW variant of the La Chapelle project is better than the Guayamouc project or a coal fired alternative. Under these circumstances, there seems to be no alternative to undertaking a new feasibility study for the 56.6 MW version of the La Chapelle project (hopefully the costs of such a study would reflect the fact that much of the information required for the analysis has already been collected).

It is therefore recommended that the Bank approve EDH's proposal to undertake a feasibility study of the 56 MW version of the La Chapelle project, as well as the supplementary studies indicated in Chapter 20 of the main volume of the Shawinigan-Ginter report. The terms of reference for the new study, however, should stipulate that the consultants who prepare the studies will take the following into account in their analysis:

1. The revised demand projections made by HQI-LGL-LMBDS in February 1983.
2. The results of the feasibility study now being completed for the Guayamouc project (including economic benefits attributable to other sectors).
3. A justification, satisfactory to the Bank, of fuel prices used in the economic analysis.
4. Shadow prices, especially the shadow price of unskilled labor used during construction (for both hydro and thermal alternatives).
5. Quantification of other (non-electric) costs and benefits of the revised La Chapelle project.

TABLEAU 4

PROJET LA CHAPELLE
ETUDE DE FACTIBILITE
HOMMES-MOIS ESTIMES VS UTILISES

<u>CLASSIFICATION</u>	<u>ESTIMATION</u> contrat	<u>UTILISES</u>		<u>TOTAL</u> H. mois
		Rapport prélim. 15/3/82 au 16/3/83	Rapport final 17/3 - 8/6/83	
Gérant de projet	6.5	10.85	2.15	13.0
Ing. Hydro-Electrique	6.0	7.75	2.12	9.87
Ing. géologue & photo-géologie	6.0	6.0	-	6.0
Hydrologie	2.0	4.5	-	4.5
Economie	2.0	3.0	0.66	3.66
Estimation & échancier	2.0	4.0	0.65	4.65
Evaluation du réseau et études énergétiques	3.0	6.2	2.6	8.8
Ligne-Poste-Sous-station	2.0	2.0	-	2.0
<u>SPECIALISTES</u>				
Hydraulique	1.0	1.0	-	1.0
Sedimentation	1.0	1.0	-	1.0
Géotechnique	1.0	2.75	-	2.75
Impact socio-écologique	2.0	4.0	1.35	5.35
Tarification	0.5	0.5	0.2	0.7
Electro-mécanique	1.0	1.0	-	1.0
Civil	1.0	1.0	-	1.0
TOTAL	37.0	55.55	9.73	65.28
<u>SUPPORT TECHNIQUE</u>				
Ingénieurs & techniciens	5.0	10.2	0.7	10.9
Dessinateurs	10.0	10.0	1.0	11.0
Secrétariat	5.0	5.9	1.0	6.9
TOTAL	20.0	26.1	2.7	28.8

PROJET LA CHAPELLEETUDE DE FACTIBILITEHOMMES-MOIS ESTIMES, UTILISES ET APPROUVES.-

<u>CLASSIFICATION</u>	<u>ESTIMATION</u> contrat	<u>UTILISES</u>	<u>APPROUVES</u>
Gérant de projet	6.5	13.0	10.85
Ing. Hydro-Electrique	6.0	9.87	7.75
Ing. géologue & photo- géologie	6.0	6.0	6.0
Hydrologie	2.0	4.5	4.5
Economie	2.0	3.66	3.00
Estimation & échéancier	2.0	4.65	4.00
Evaluation du réseau et études énergétiques	3.0	8.8	6.20
Ligne-Poste-S/Station	2.0	2.0	2.0
<u>SPECIALISTES</u>			
Hydraulique	1.0	1.0	1.0
Sédimentation	1.0	1.0	1.0
Géotechnique	1.0	2.75	2.75
Impact socio-écologique	2.0	5.35	3.00
Tarifification	0.5	0.7	0.7
Electro-mécanique	1.0	1.0	1.0
Civil	1.0	1.0	1.0
TOTAL	37.0	65.28	54.75
<u>SUPPORT TECHNIQUE</u>			
Ingénieurs & techniciens	5.0	10.9	7.0
Dessinateurs	10.0	11.0	11.0
Secrétariat	5.0	6.9	6.9
TOTAL	20.0	28.8	24.9