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**PROSPECTS FOR DISTRIBUTION AND MARKETING OF SUB-SAHARAN
NATURAL GAS THROUGH A TRANS- AFRICAN GAS PIPELINE***

Prepared by ECA Secretariat.

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INTRODUCTION

1. The proven reserves of African natural gas are estimated to be over 7,000 billion cubic meters. The sum of the very unequally distributed gas resources of Africa is much greater than the possibility of their absorption by domestic markets. This asset appears to be potentially destined to supply intercontinental trade, and also ultimately promises inter-African commerce.
2. However, exploration activities in Africa have so far been, on average, at a very low level. Only Algeria and, to a lesser degree, Libya and Egypt have an intensified inventory of their gas resources by dint of their trade with OECD countries. At the same time many African gas producing countries flare a considerable amount of their associated gas, which could be utilized or reinjected back into the formation.
3. Given the vast gas reserves the continent has at its disposal, African countries could, provided the necessary technical and financial assistance is available, enhance its utilization facilities, distribution system and marketing management of natural gas in order to meet partially or totally the demand of African countries in natural gas and to establish its proper place in the international market. Thanks to its relatively favourable position in relation to American and the OECD countries of Europe it could easily compete in the market with gas producers in the Middle East and Far East regions.
4. Taking into consideration the growing concern all over the world with the problem of environmental pollution, eradication of rain forests and search of new sources of energy, and particular actuality of all these problems for Africa, development of natural gas utilization and distribution could be one of the relevant solutions for the continent.
5. It is considered that a well designed pipeline network system could contribute to increasing the advantage in the export market and at the same time assist in supplying the African countries - potential consumers of natural gas along the route of the pipeline network.
6. Considering the appropriate development of gas transportation system in Africa as an issue of the top priority, the Conference of African Ministers of Transport, Communications and Planning, held 8 to 11 May 1983 in Cairo (Egypt), by its Resolution ECA/UNTACDA/Res.83/28 requested ECA to undertake a study entitled "Pre-feasibility study on the design of a network of gas pipelines and an integrated communication systems for marketing African natural gas", in order to:
 - (i) Enable African producers countries to market their products on the international market;
 - (ii) Enable African consumer countries to use this network to satisfy their requirements.

7. Implementation of the study responded to the over-all objectives of the first United Nations Transport and Communications Decade in Africa (UNTACDA, 1978-1988):

- "Promotion of the integration of transport and communication infrastructures with a view to increasing intra-African trade";
- "Ensuring the coordination of the various transport systems in order to increase their efficiency".

8. With particular reference to the pipeline transport, the idea of a survey "needed to examine under what conditions and for which African subregion this type of equipment could contribute to the economic development of the continent", has been clearly expressed in the Global Strategy and Plan of Action of UNTACDA (Doc.E/CN.14/726/E/CN.14/TRANS/147).

9. Through promoting economic cooperation among African countries in conformity with the fundamental policy of the Lagos Plan of Action, it makes a significant contribution to the planned establishment of the African Economic Community by the year 2000, and offers also possibilities for development of cooperation between the African region and other regions of the world, particularly Europe.

II. OBJECTIVES OF THE STUDY

10. The main objective of the prefeasibility study is to assess the potential benefits of various gas transport systems in Africa with a view to enabling African producers to market the natural gas available in several countries on the national and international markets. The study therefore considers various pipeline transport network systems and other transport modes such as road, rail and ship, to serve African countries en route as well as to potentially increase Africa's advantage in the export markets in the OECD countries of Europe, America and other consumers.

11. To verify the feasibility of this plan it was decided to base the study on a preliminary conceptual design of a network of gas pipelines with an integrated communications system and other auxiliary facilities and equipment.

12. Furthermore, consideration has been given to organizational and training needs as well as any potential legal problems, in order to identify the institutional challenges which must be addressed to mobilize the African countries to promote a wider exploration and broader utilization of Africa's vast and highly valued resources.

III. GENERAL APPROACH TO IMPLEMENTATION OF THE STUDY

13. In view of the geographical extension of the continent, and the wide distribution of the locations of known gas resources, the approach to carry out the study of this magnitude had to be properly planned and included the following phases:

14. Data gathering

Data and information, required for analysis, were gathered through:

- Questionnaires, sent to selected African countries;
- Data collection visits to 14 African countries.

Additional information, relating to gas supply, markets, facilities, costs and export prices has been gathered and compiled in Europe and United States of America.

15. Data verification

Large amount of documents, collected in the process of data gathering, inevitably contained certain contradictions in the data. To resolve the conflicts, a number of direct interviews were carried out with the authors of documents. Discussions with representatives of different oil and gas companies also helped to verify most of the conflicting information. However, it should be stated very clearly, that a study covering the whole of Africa, could not unmistakingly consider all available documentation, and certain discrepancies in data and information seem to be unavoidable.

16. Data analysis

After a reliable data base had been established, the data were analyzed and the various technical studies concerning reserve estimates, market estimates, etc. conducted. The data analysis and particular preparatory studies constituted the basis for the determination of technical project concepts concerning gas processing facilities as well as pipeline and gas distribution systems.

17. Economic and financial evaluation

The generally accepted procedures used by the World Bank and other international agencies were utilized for the economic and financial evaluation of selected promising project packages.

IV. CONCLUSIONS AND RECOMMENDATIONS OF THE STUDY

A. General conclusions

18. Apart from the North African countries, Africa has a great potential to develop its gas industry for both the African market and export demand.

19. Presently Africa is still the least explored continent with regard to its gas resources and it can be expected that new resources will be discovered which will increase the importance of Africa in the world gas industry.

20. Today Africa accounts for about 6.6 per cent of the worlds total proven gas reserves and only Algeria and Nigeria can be considered as long-term surplus countries. All the other countries are either "small surplus countries", "self-supplies" or "deficit countries".

21. Considering future prospecting it can be clearly stated that the African reserves at hand are big enough to supply all possible African markets once a substantial consumer market exists and to cover future export demands beyond the year 2000.

22. However, the gas reserves are not evenly distributed and two main regions can be identified:

(a) The Sahara region with the main fields being in Algeria (42 per cent of the Africa's total proved reserves);

(b) The Gulf of Guinea with the main fields being in Nigeria (32 per cent of the Africa's total proved reserves).

23. Medium gas fields in several countries along the eastern coastline of Africa have been identified up to now. The known volumes of these reserves could only support local distribution systems.

24. Considering on the one hand the regional disparity of resources and potential gas markets, and the present economic situation in Africa on the other hand, an integrated continent-wide gas network is economically not justified and cannot be recommended for the time being. Therefore only locally delineated gas supply systems were proposed for further investigation.

25. It could be expected that the natural gas will easily find its way to the local consumers as soon as the first investment in a gas industry has been made and the possibilities of substituting other energy forms have been demonstrated.

26. In this context gas could be provided for:

(a) Industrial supply;

(b) Small- and medium-scale power generation;

(c) City gas supply in the metropolitan areas;

(d) Transport sector, using Condensed Natural Gas for trucks, railway locomotives, etc;

(e) Residential use for cooking and heating;

(f) Fertilizer production.

27. Another aspect should be noted: African natural gas could greatly support African internal trade and be the promoter of self-sufficient development.

28. Concerning exports, sufficient proven reserves are at hand to meet possible future gas demand in OECD countries beyond the year 2000. However it should be once again clearly stated that besides Algeria and Libya only the Gulf of Guinea region can be seen as a potential exporter for the time being.

B. Recommendations for further investigations

29. The assessment of the current energy situation of the African continent indicates very clearly that in all African countries with sufficient reserves of natural gas the development of gas utilization systems seems in principle to be reasonable, at least in the long term or at the very least for special use.

30. A number of scenarios in the gas-possessing African countries have been considered by this study. The following project packages have been recommended by the study to be followed-up, taking into account the financial requirements for further investigations, especially for the intended implementation of gas utilization systems:

Trans-Sahara Gas Trunk Line System

31. The economic evaluation of this pipeline, which is dimensioned to cover en-route demand as well as the expected export possibilities to Europe, indicates clearly that this project can be expected to turn out economically feasible. The study strongly recommends continuing with a feasibility study for such a system, which can be considered as an outstanding project for the whole of West Africa.

Mozambique-Zimbabwe Gas Distribution/Utilization System

32. A detailed feasibility study for a regional gas distribution system covering Mozambique and investigating gas export possibilities to Zimbabwe or other neighbouring countries. The economic evaluation, made by this prefeasibility study, indicates very clearly that such a project could improve the situation in the energy sector of Mozambique substantially as well as stimulate the region's development and economy.

Tanzania-Kenya Gas Distribution/Utilization System

33. A detailed feasibility study has been recommended for a regional gas distribution system covering Tanzania and Kenya. The possible technical layout and the economic evaluation indicate clearly that such a system can reach a satisfactory rate of return and would stimulate regional and economic development.

Ethiopia Gas Distribution/Utilization System

34. For Ethiopia there exist some preparatory studies which clearly indicate that the development of a gas utilization system can help to solve the long-term energy problem in the country. It is recommended that this project be followed-up as a typical example of developing a small-scale gas industry in an African country.

35. It should also be noted that this project suggests the Terms of Reference for the feasibility studies, proposed above.

V. FOLLOW-UP OF THE STUDY BY ECA AND INTERNATIONAL
COOPERATION REQUIRED

36. The study, which was completed in 1990, was disseminated to all African countries, which could benefit from realisation of the recommendations of the project.

37. These countries were requested to submit to ECA their comments on the study.

38. The sensitization missions to a number of African countries were undertaken with the view to securing the agreement of the countries to the findings of the study and to ensure follow-up actions.

39. Nigeria accepted, in principle, to host this summer a meeting of experts, where the comments by African countries on the projects would be consolidated and a set of recommendations elaborated on the follow-up actions, including expected recommendations on continuation of the project by conducting the proposed feasibility studies. The report of the meeting and recommendations are planned to be brought to the attention of the Conference of African Ministers of Transport, Communications and Planning for endorsement.

40. The implementation of the follow-up projects, recommended by the prefeasibility study, respond to the objectives of both the Second United Nation Transport and Communications Decade in Africa (UNTACDA-II, 1991 2000) and Industrial Development Decade in Africa (IDDA), in that the implementation of these projects will contribute significantly to the socio-economic development of the continent, enhancement of the transport and industrial components of the over-all African economy.

41. While already now a number of African gas producing countries are attempting to develop this important sector of their economies, without external assistance, both technical and financial, it would be unrealistic to expect in near future a significant positive result from those activities.

42. At the end, not only African countries alone could be beneficiaries of the natural gas industries' development in the continent, but the whole of international community, economically-socially- and environmentally-wise.

43. The opportunity of this Symposium is taken to appeal to the international community to pay closer attention to the unutilized potential of the African natural gas reserves and to give its helpful hand to African countries in their efforts to develop this important sector of economy. The United Nations Economic Commission for Africa will only welcome such an initiative and stands ready to provide, within the scope of its competence, an assistance and advice.