

HYDROPOWER DEVELOPMENT IN NORTH AFRICA

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1- GENERAL

1-1 The population of Africa are about 700 Million people, and the energy consumption in Africa constitutes less than 3% of the world consumption.

1-2 ENERGY SOURCES OTHER THAN HYDRO IN

NORTH AFRICA are:

- i. Normal gas and oil products in Algeria, Egypt, Tunisia.
- ii. Oil product in Libya, Sudan.
- iii. Oil products and coal in Morocco.

1-3 THE IMPORTANT RIVERS IN NORTH AFRICA REGION ARE:

- i. Algeria: River El-Shayef and River Viena.
- ii. Egypt: The River Nile Aswan High Dam and Barrages.
- iii. Morocco: El-Malyan River, Om El-Rabia River, Sago River, Yaraa River, and El-Karis River.
- iv. Tunisia: Mogarada River, and Mafig River.
- v. Sudan: The River Nile and its tributaries.
- vi. Lybia: n.a.

1-4: I would like to remind of the discussions of our Heads of States and Governments at the respective Summits of the African Union and in the context of the New Partnership for Africa's Development (NEPAD). And the Political Declaration adopted at the Bonn International Conference for Renewable Energies, and emphasized in the Beijing Declaration on Hydropower and Sustainable Development. As more than 80% of the people in Africa do not have access to electricity, it is essential for achieving the objectives of the New Partnership for Africa's Development (NEPAD), MDGs and sustainable development.

And to promote hydropower development, within the principles of integrated transboundary water resource management and benefit sharing arrangements and no harm, and to take the necessary measures of mitigation and adaptation to climate change and to call upon Multilateral Financial Institutions (MFIs) to commit to assist in alleviation of the financial challenges experienced by the continent.

2. THE SITUATION OF HYDROPOWER IN NORTH AFRICA IS AS FOLLOWS:

- (i) **For Algeria** the feasible hydro power is 700 MW (12,000 GWh); the installed is 280 MW, the production is 500 GWh/year 2% of the total energy in Algeria (the 98% from oil and natural gas).
- (ii) **For Egypt** the feasible hydropower is about 15,000 GWh/year; the installed is 2,810 MW; the production is 11,450 GWh/year 20% of the total energy (80% from oil and gas). 65 MW under construction.

(iii) **For Morocco** the feasible hydro is 4,000GWh/year, the installed is 1205 MW, the production is 2350 GWh/year 18% of the total energy (82% from oil and coal).

(iv) **For Tunisia** the feasible hydro is 160 GWh/year, the installed hydro is 64 MW, the production is 100 GWh/year 1% of the total energy (99% from oil and natural gas).

(v) **For Sudan** the feasible hydro is > 5,000 MW (19,000 GWh), the installed is 1588 MW hydro; the production is 6300 GWh/year 83% of the total energy (70% from oil).

(vi) **For Libya** primarily energy is from oil.

3. BENEFITS AND IMPACTS:

3.1 BENEFITS FROM HYDROPOWER

- (i) Hydro Dams are multipurpose.
- (ii) Hydro energy is renewable, non polluting, capital intensive low, operation cost.
- (iii) Contribute to agricultural and industrial development and poverty alleviation.

3.2 IMPACTS:

Environmental, ecosystem, social impact that necessitate remedial projects and proper resettlement of the displaced (MEROWI).

4. NORTH AFRICA REGIONAL TRANSMISSION INTERCONNECTION:

3.1 BENEFITS:

- (i) Promote regional trade economic and political cooperation.
- (ii) Pooling reserve capacity reduce cost of additional plants and provide economic use of hydropower for peaking and thermal for off peaks.

4.2 EXISTING AND FUTURE INTERCONNECTION SYSTEMS

- (i) EGYPT-LIBYA 220 KV and EGYPT-JORDAN 400 KV both in 1997.
- (ii) TUNISIA-ALGERIA-MOROCCO-SPAIN in 1997 and 400 KV Sea cable between Morocco and Spain.
- (iii) LIBYA-TUNISIA 220 KV completed but pending agreement with the European UCTE standards and upgrading to 400-500 KV.
- (iv) The Interconnection Agreements in N.A. comprise the construction and the legal aspects, and guides for operation, control, and tariff structures.

(v) The Regional N.A Interconnection Benefits are:
Regulation and stabilization of the frequencies,
minimizing power hazard, reasonable tariffs and
application of technologies and of international
standards.

(vi) The Nile Basin Initiative:

It comprises the 10 Riparian Nile Basin countries and is
based on the shared vision and the subsidiary action
Projects of the Eastern and Equatorial sub-basins
addressing irrigation, hydropower, power trade,
watershed management, benefits, sharing, etc.

The Diagrams on my paper shows the following:-

- (b) SUDAN-ETHIOPIA, hydropower and power trade interconnections between Sudan and Ethiopia 321 km long 240 KV with partial World Bank support.
- (c) Ethiopia-Sudan-Egypt, power trade interconnection is under study with support from the ADB. Ethiopia lies in East Africa Region but has viable interconnection with Sudan-Egypt-Ethiopia has a hydro potential > 35,000 MW, and Sudan 5,000 MW and Egypt utilized the 2,100 MW of Aswan Dam and has natural gas potential.
- (d) There is the the proposed DRC INGA Falls SUDAN-EGYPT-NORTH AFRICA-EUROPE Interconnection to export part of the INGA falls hydropower (Gross energy 77,400 GWh/year).
- (e) There is the Proposed hydropower Interconnection between Behr ElJebel south Sudan and the Equatorial Lakes Region (1000 MW) in E.A.

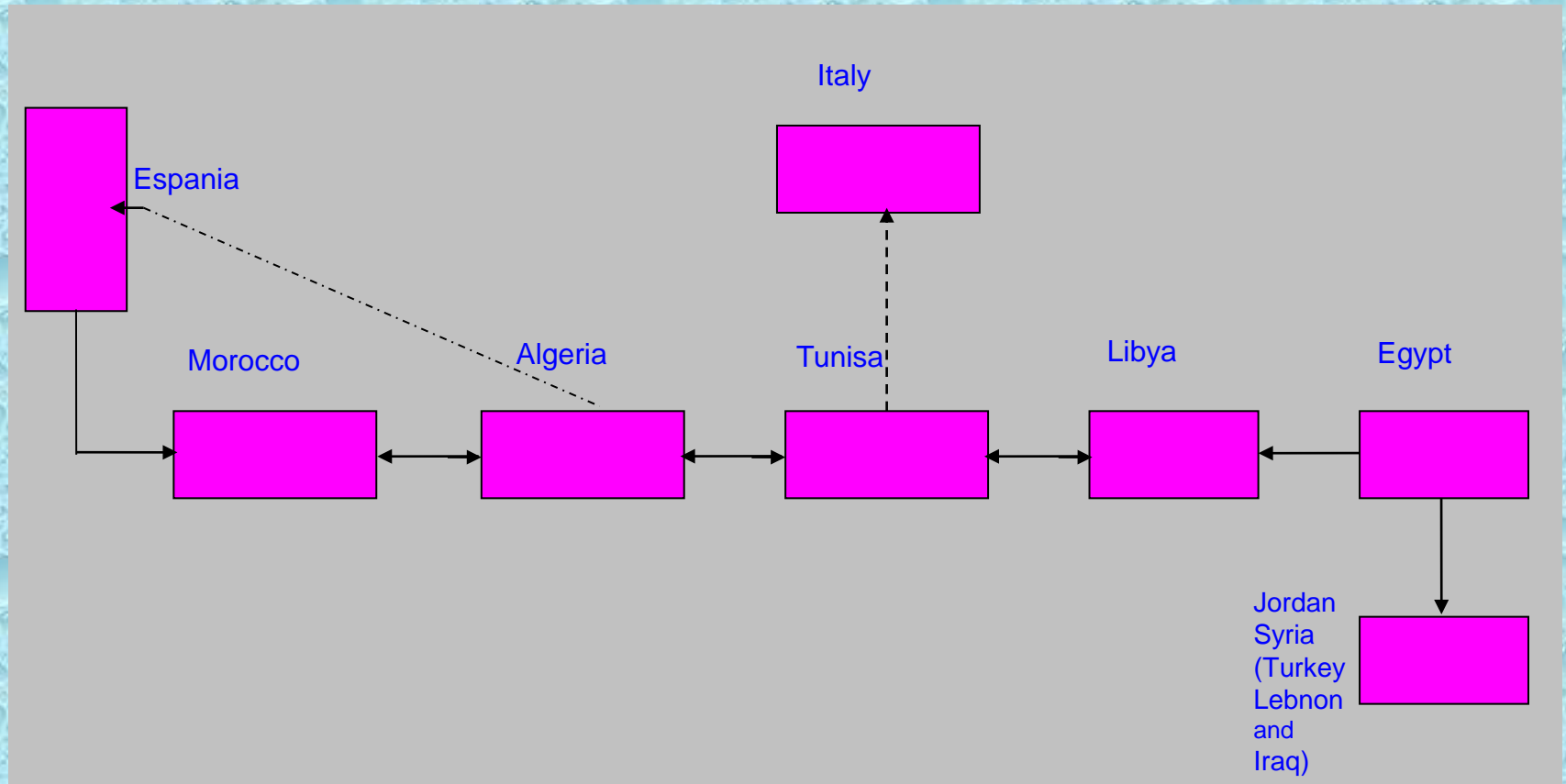
(f) There is the Proposed hydropower Interconnection between Baro/Akobo in Ethiopia (> 2,800 MW) and Sudan.

(g) There are plans to construct 1,400 MW natural gas power project in Tunisia interconnection with Italy (300 KV Sea cable) and a similar 2,000 MW project in Algeria to interconnect with Spain.

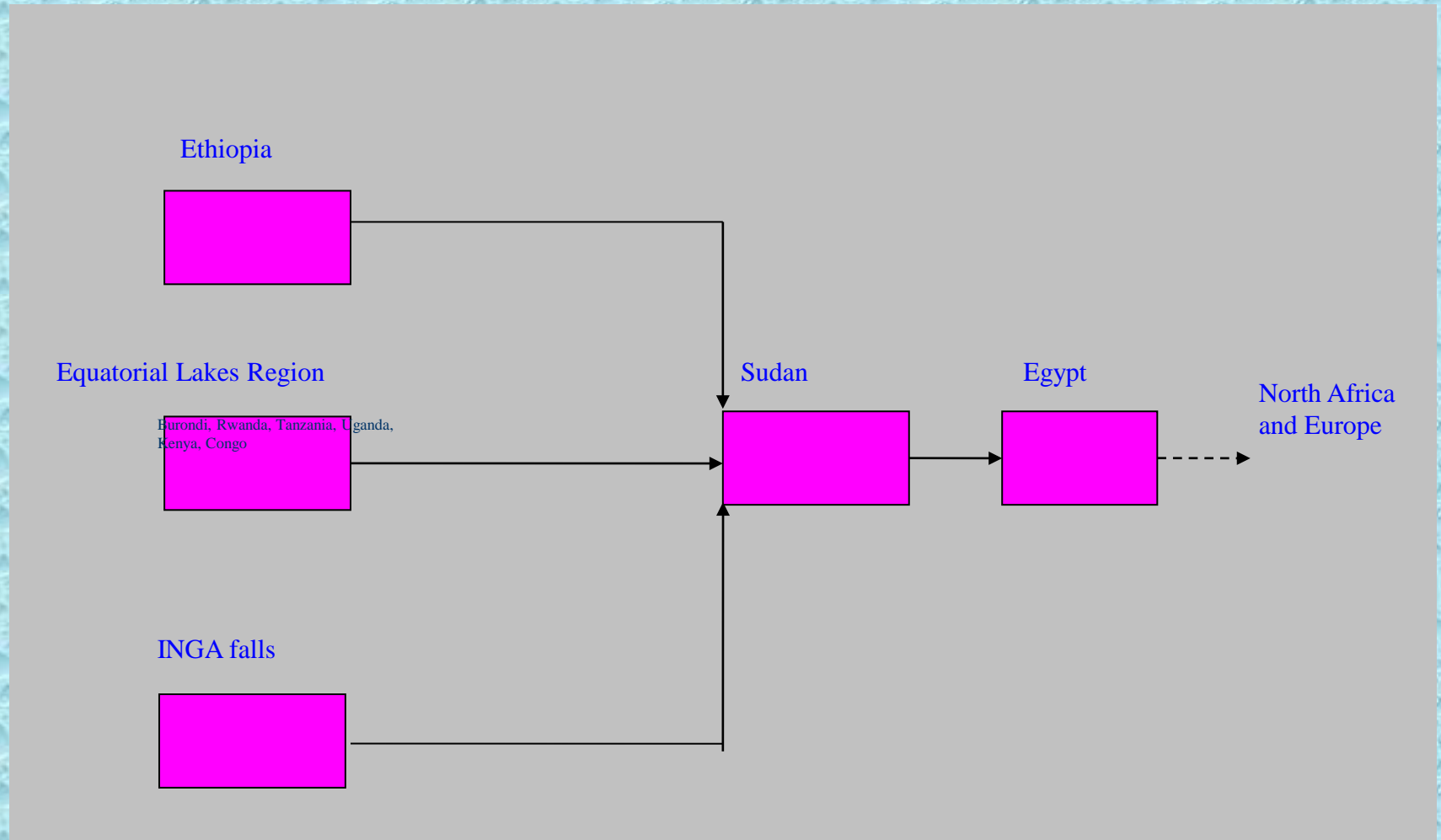
(h) There are plans to interconnect the Medit. Region with the M.E. and Europe.

Electric Power Interconnection •

NORTH AFRICA INTERCONNECTION •



THE PROPOSED NILE BASIN AND INGA INTERCONNECTION WITH NORTH AFRICA



Other Proposed Regional Transmission Projects in South, West, Central and East Africa:

- (i) Upgrade of Zambia, D.R. Congo – S. Africa Interconnection.
- (ii) Zambia-Tanzania Interconnection.
- (iii) Namibia-Botswana Interconnection.
- (iv) W. Africa Grid Network and Power Pool.

5. OPPORTUNITIES AND CHALLENGES

- (i) Political commitment,
- (ii) Securing funds (World Bank, ADB and others; but priority to self reliance).
- (iii) Implementation of the NEPAD, the MDG, the CSD, the WSSD TARGETS on energy and particularly Hydropower in Africa.
- (iv) Multi Purpose Dams to boost economy.
- (v) Projects to cater for negative environmental and social impacts and resettlement.
- (vi) Competent legal and institutional structures.
- (vii) Cooperative shared River Basin organization.

We should enhance opportunities and overcome challenges Through Energy and in particular Hydropower Development in Africa for the welfare of N.A and **All AFRICA.**