INFRASTRUCTURE INTEGRATION IN THE WAPP REGION

CEE-UT Workshop
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Presentation Outline

Present situation
WAPP organisation
WAPP Master Plan
WAPP Transmission Priority Projects
WAPP Generation Priority Projects
The way forward

THE PRESENT SITUATION

Africa, The Dark Continent
Current Power Supply Situation in the West African Sub-Region

- Inadequate/Non Existent Transmission Interconnections in ECOWAS Member States and also between ECOWAS Member States;

- Inadequate Generation Capacity in ECOWAS Member States resulting in Power Shortages;

- Inability of ECOWAS Member States to raise the necessary financing to implement the projects required to alleviate the situation.

ECOWAS Demand-Supply Balance

- Met 54%
- Unmet 46%

THE WEST AFRICAN POWER POOL
To address this situation of need, the Economic Community of Western African States (ECOWAS) created a new organization: the West African Power Pool (WAPP).

The vision of the West African Power Pool (WAPP) Organization is to integrate the operations of the national power systems into a unified, sustainable regional electricity market, with the ultimate goal of providing the ECOWAS Member States with stable and reliable electricity supply at affordable cost.

Formed January 2006 by decision of the Heads of State and of Government:
- Articles of Agreement approved
- WAPP = Specialised Institution of ECOWAS
- Headquarters Agreement with the Republic of Benin

Articles of Agreement:
- Utility association
- Defines governance/operation structure and roles
- Operation funded by Members’ contributions

Improve supply of reliable, stable, sustainable, affordable electricity

Develop integrated regional electricity market:
- Least cost development
- Economies of scale
- Access to primary energy resources
- Increased coverage
- Maximum benefits through trade
WAPP Objectives

- Facilitate Infrastructure development
  - Transmission interconnections
  - Exploit primary energy resources (Natural Gas, Hydro)
- Capacity-Building for Secretariat and Member Utilities
- Develop harmonised Codes & standards to facilitate operation, trade and development, e.g.
  - Operation Manual (OSMP)
  - Planning & design criteria
- Develop and improve energy Trading
  - System monitoring & coordination
  - Standard agreements (trading, wheeling, power purchase)
  - Electricity market (rules, governance, metering, settlement)

The Challenge: Integrating Fragmented National Power Systems

Master Plan for Infrastructure Development

In line with WAPP Mission and Objectives, the ECOWAS Council of Ministers adopted in 1999 a Master Plan to develop electricity generation and transmission infrastructure, and to interconnect the national electrical power systems.
Master Plan for Infrastructure Development

Revised in 2004, the Master Plan

- Defines the long-term vision and implementation strategy for the regional transmission system
- Identifies the capital costs of the regional transmission investment program over the next 17 years (2020 horizon)
- Identifies requirements for the stability, reliability and operability of the regional systems

Investment Requirements

Overall Generation and Transmission Investment Requirements

- 9 billion USD by 2011 (2004 prices)

WAPP IMPLEMENTATION STRATEGY

- Coastal Transmission Backbone Subprogram (Côte d’Ivoire, Ghana, Benin/Togo, Nigeria)
- Inter-zonal Transmission Hub Sub-program (Burkina Faso, OMVS via Mali, LSG via Côte d’Ivoire)
- North-core Transmission Sub-program (Nigeria, Niger, Burkina Faso, Benin)
- OMVG/OMVS Power System Development Subprogram (The Gambia, Guinea, Guinea Bissau, Mali, Senegal)
- Côte d’Ivoire-Liberia-Sierra Leone-Guinea Power System Re-development Subprogram (Côte d’Ivoire, Liberia, Sierra Leone, Guinea)
**WAPP PRIORITY PROJECTS**

**Transmission Projects to 2011**
- Ikeja West-Sakété (Nigeria-Benin) 2007
- Bobo Dioulasso-Ouagadougou (Burkina Faso) 2008
- Aboadze-Volta (Ghana) 2008
- Volta-Momé Hagou-Sakété (Ghana-Togo-Benin) 2009
- Aboadze-Prestea-Kumasi (Ghana) 2009
- Bolgatanga-Ouagadougou (Ghana- Burkina Faso) 2010
- Han-Bobo Dioulasso-Sikasso-Bamako (Ghana-Burkina Faso-Mali) 2010
- OMVG (Guinea-Guinea-Bissau-The Gambia-Senegal) 2011

**Transmission Projects 2011-2020**
- Côte d’Ivoire-Liberia/Guinée Forestière-Sierra Leone-Guinée Maritime
- OMVG Phase II (loop via Sambangalou, Tambacounda)
- OMVS Kayes-Tambacounda Line (Mali-Senegal)
- Nigeria-Niger-Benin, Burkina Faso (North Core)
- Côte d’Ivoire-Mali
- Côte d’Ivoire-Guinea-Mali

**WAPP Zone A Priority Projects**

*330kV WAPP Coastal Transmission Backbone*
WAPP Zone B Priority Projects

Generation Projects

- **Hydro:**
  - OMVS - Féllou
  - OMVG - Kaléta
  - OMVS - Gouïna
  - OMVG - Sambangalou
  - OMVG - Souapiti
  - Liberia - St. Paul River, Mt. Coffee
  - Sierra Leone - Bumbuna, Benkongor, Yben
  - Guinea - Kassa
  - Nigeria - Zungeru, Mambila, Onitsha, Ikom, Gurara, Makurdi, Dyondyonga, Gambou, Kandadji

- **Thermal:**
  - Nigeria - Okitipupa, Papalanto, Ibom Power, Alaoji, Geregu, Afam Vi
  - Ghana - Takoradi steam turbine, Tema CCGT
  - Senegal - Kahone

**Regional energy development – generation projects**

**THE WAY FORWARD**

- Realizing WAPP vision - the integration of the presently fragmented national power systems into a unified, sustainable regional electricity market - requires a long and complex process which cannot be fully predicted at this stage. We may, however, attempt to anticipate the series of steps which need to be taken for the creation of a regional electricity market.
WHAT IS A "REGIONAL ELECTRICITY MARKET"

- Today, there are cross-border exchanges of electricity without competition among sellers, or among buyers
  - A market would require some kind of competition
  - A regional market is different from a national market
- We recommend the following definition: a regional electricity market exists, when
  - Producers are able to export energy on a competitive basis, or sell to a regional power exchange, and
  - Distribution companies and large end users are able to import energy on a competitive basis, or buy from a regional power exchange

CREATION OF WAPP ELECTRICITY MARKET
MEDIUM TERM OBJECTIVE (2011)

- Genco-transco
  - Production
  - Transmission
  - Power producer
  - Power producer
- System operator
- Distribution

SUGGESTED PHASES FOR MEDIUM TERM OBJECTIVE (2011)

- Phase 1: Bilateral trading
  - Measurement of Net Transfer Capacity (NTC)
  - Unbundling of accounts for the regional network
- Phase 2: Bilateral trading, with a few transit flows
  - Allocation of NTC on the basis of contract priority
  - Calculation of transmission tariffs for regional network

SUGGESTED STEPS FOR MEDIUM TERM OBJECTIVE (2011)

- WAPP member utilities should -
  - Establish clear rules on who has the right to use cross-border interconnection capacity
    - Should the importing country claim 100 percent for its own national power company, or genco-transco?
    - How much capacity is available for transit? When?
  - Separate the regional network from the national network
    - Best solution: separate ownership
    - Next best solution: separate accounts
  - Agree on who will pay a transmission tariff for use of the new 330kV and 225kV lines
  - How much capacity will be “reserved” for IPP deals?
  - Develop a standard transmission service contract
LONG TERM OBJECTIVE: TRANSITION FROM REGULATED PRICES TO WHOLESALE MARKET PRICES

Phase 3: Merging of selected zones in the regional network
- In each zone there is a regional transmission company or the network is operated as one transmission company

Phase 4: Start of the regional electricity market
- Competition among buyers and sellers
- Each market participant gets access to the whole WAPP regional network by paying only one transmission tariff
- Transit tariffs and export tariffs are eliminated

Phase 5: Start of a regional power exchange
- Congestion management approach

SUGGESTED PHASES FOR LONG TERM OBJECTIVE (2020)

Given a political choice between:
- Low electricity prices set by the government, resulting in blackouts and shortages of generating capacity
- High electricity prices set by a well-designed market, with no blackouts and no generating capacity shortages

...many governments would opt for the 1st alternative

Electricity prices must not be too low, or power shortages will follow, nor too high, or social unrest will follow. Finding a balance absorbs most political attention, causing to lose sight of the longer-term objective of creating a regional electricity market which, with help from Adam Smith’s invisible hand, will automatically find the correct price levels.

THE FINAL OBJECTIVE
Lighting Up West Africa

THANK YOU