Hydropower Development in Africa

Problems and Prospects

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Outline

- Overview of African Power Sector
- Current status of hydropower in Africa
- Potential contribution of hydropower
- Development of hydro projects
- Environmental and social concerns
- Financing Hydro Projects
- Action Plan to meet NEPAD initiative

Introduction

- Focus of NEPAD on Energy
- Wood, peat & animal waste - today's main energy sources in Africa
- Role of modern energy in alleviating poverty in Africa
- Potential for Hydropower energy for development

Overview of Power Sector

- Today only 10% of Africans have access to electricity
- Uneven distribution of electricity with concentration in a few countries
- 82% of electricity generation in Northern & Southern regions

Overview of Power Sector

- Lowest Annual Per capita consumption in the world (450 kWh)
- Moves to increase and redistribute access through formation of power pools.

Current Status of Hydropower

Gross Theoretical Hydropower Potential (GWh/year)	Technically feasible Hydropower Potential (GWh/year)	Economically feasible Hydropower Potential (GWh/year)	Installed hydro capacity (MW)	Production from hydro plants (GWh/Year)	Hydro capacity under construction (MW)	Planned hydro capacity (MW)
4,000,000	1,750,000	1,000,000	20,300	76,000	>2,403	>60,000

Source: 2001 World Atlas and Industry Guide International Journal of Hydropower and Dams

Current Status of Hydropower

- Distribution

  North Africa - 23%

  West Africa - 25%

  South/Central/Eastern Africa – 51%

Current Status of Hydropower

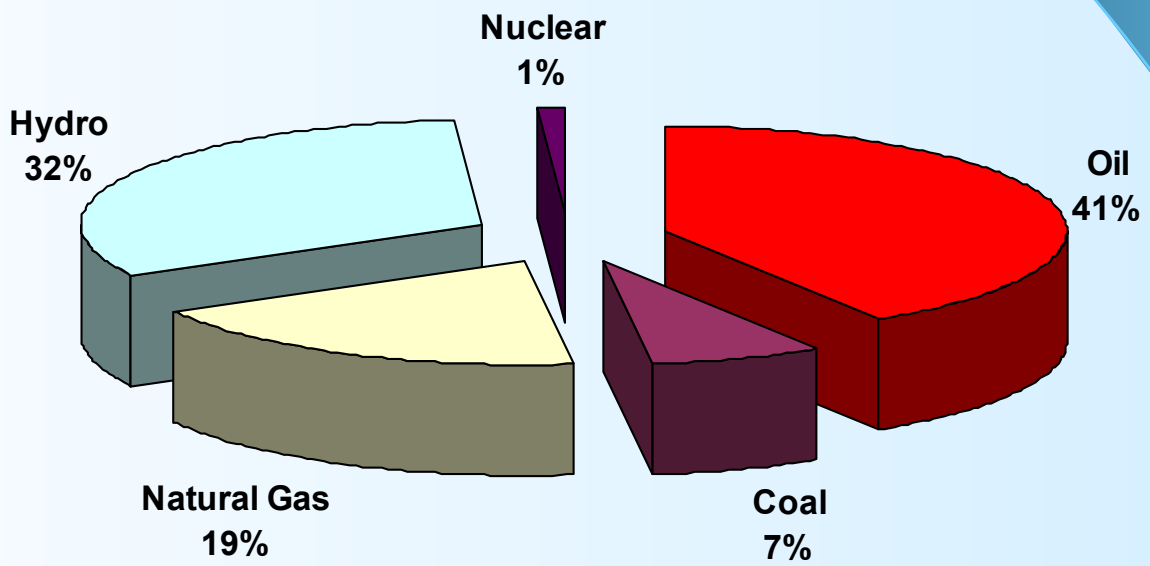
- Hydro-projects built to provide basis for industrialisation and social and economic development

  Benefits include:

  - Water Supply
  - Irrigation
  - Navigation
  - Fisheries
  - Tourism

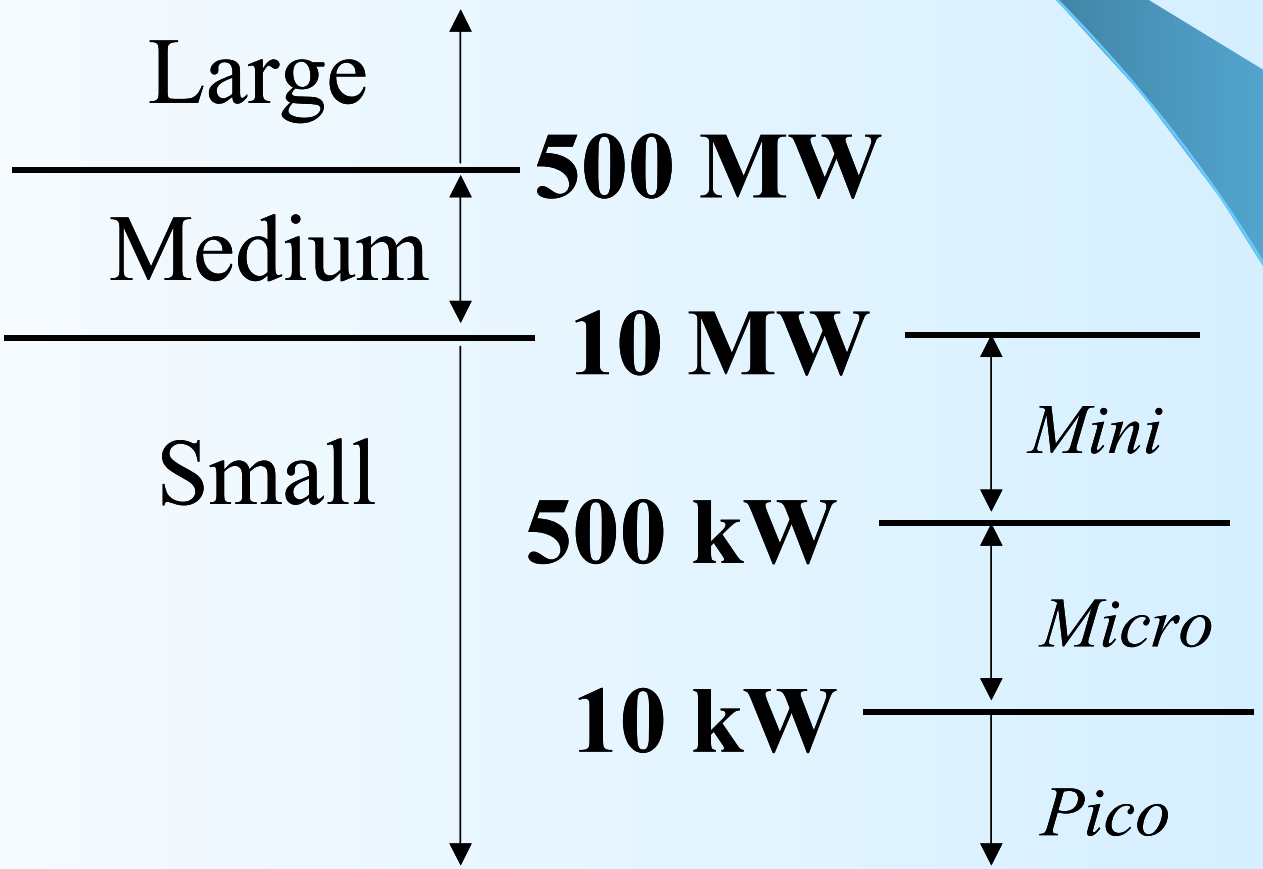
Current Status of Hydropower

Contribution of Hydro to Africa's Primary Energy Needs - 2002



Potential Contribution of Hydro

Classification of Hydropower Plants



Potential Contribution of Hydro

- Feasible potential of 1,750,000 GWh/year
- Only 4.3% exploited
- Rapid exploitation hampered by low demand and dispersed population
- Opportunities of small hydro in matching supply with demand

Potential Contribution of Hydro

Small hydro

Advantages include:

- Competition in supplying Africa's mainly rural populations.
- Low capital requirements
- Modular, sized to meet demand
- Unexploited potential

Potential Contribution of Hydro

Small Hydro

- Development hampered by preference for large projects.
- Investment concentrated mainly on large dams because
  - Easier to finance
  - Lower unit cost of generation

Potential Contribution of Hydro

Large Hydropower

- Large undeveloped capacity (e.g. INGA)
- Potential for development as regional projects to service and expand market
- NEPAD to facilitate the formation and expansion of interconnected systems and power pools

Development of Hydropower

- Focus on development as regional projects
- Development of regional transmission infrastructure for power evacuation and market creation

Development of Hydropower

Proposed regional hydro projects :

- INGA in DR Congo
- Kafue Gorge Lower in Zambia
- Cabora Bassa in Mozambique
- Maguga in Swaziland
- Bui in Ghana
- Bujagali in Uganda

Development of Hydropower

Proposed Regional Transmission Projects

- Upgrade of Zambia - DR Congo - S. Africa Interconnection
- Zambia-Tanzania Interconnection
- Namibia-Botswana Interconnection
- W. Africa Grid Network and Power Pool

Development of Hydropower

- Phased development of transmission to lead to Africa-wide interconnected network
- Role of NEPAD in encouraging regional trade in electricity

Social & Environmental Issues

Mitigation Of Environmental Impacts

- Environmental and social Impact of Dams
- Need for pre planning and continuous assessment
- Post Implementation Monitoring
- Resettlement
- Afforestation
- Power costs and prices to fully reflect environmental and social costs
- Those who sacrifice need to be compensated

Financing Hydropower

- Traditionally been public financed
- Today, there is shortage of public finance
- Need to attract private sector financing
- Mitigation of risks perceived by investors
- Other risks:
  - Hydrological uncertainties
  - high Upfront Capital Investments
  - Cost overruns and time slippage
  - negative public perception

Action Plan to achieve NEPAD Initiative

Short Term

To reduce costs, extend access and ensure supply available on sustainable basis, NEPAD should help utilities and RECs to:

- Develop proper policy framework, pricing and tariff environment
- Improve managerial and technical capabilities
- Improve existing hydro plant capacity
- Advance development of regional projects

Action Plan to achieve NEPAD Initiative

Medium to Long term

- Implement identified projects
- Build capacity for medium and small hydro

Conclusions

Major problems facing hydro power development include:

- High up-front investment requirements
- High risks (technical, economic, commercial, environmental and social)

Low access of population to electricity creates opportunities for hydropower development

Conclusion

Strategies

- Rehabilitation and operational improvement of existing hydro plants
- Collaboration of NEPAD and Regional Economic Commissions