

9 ELECTRICITY SUPPLY

SUMMARY:

- Electricity supply is an essential component of modern urban infrastructure – for efficient commercial and public sector activities, and also for the quality of domestic life.
- Diesel-fired generators are the most common form of power generation – and are likely to remain so for the foreseeable future.
- Development of hydro-electric power on the Nile is under advanced discussion but it will be some time before power comes on line.
- Solar and wind power are not viable options at present for town supply – but they could be relevant for individual institutions.
- Distribution is typically done by overhead cable attached to reinforced concrete or wooden poles. It is a flexible network - the power goes wherever supply is needed – so power supply does not shape the form and direction of urban development, c.f. water supply or drainage.
- Low income groups place a high value on domestic supply and lighting of public spaces for the improved convenience to social and economic activities after dark.
- Consumers must pay for the power they consume – a variable tariff structure will enable cross subsidy from high consumers to low consumers.

Introduction

- 9.1 Electricity or power supply is an essential component of infrastructure, providing electric light and power to run machinery and equipment. It is crucial for efficient commercial and public sector activities; and it is important to the quality of domestic life.
- 9.2 Current supply in urban areas is very limited due to lack of investment over many decades and the resulting degradation of power stations and distribution networks. GoSS has given high priority to the improvement of power supply in all State capitals.
- 9.3 Power supply operates independent of other components. It supplies a service on which other infrastructure components depend for their effective operation - but there is not the same interconnection that exists between the environmental health components. So the planning of power supply does not need to be so carefully integrated with planning the other components.

⇒ 6 - Environmental Health

- 9.4 Conventional power supply comprises a three-step process:



Generation

- 9.5 **Diesel-fired generators** are the most common method used in Southern Sudan. A number of generator units are installed to operate in parallel, the size and number depending on the required power output.
- 9.6 The system is **flexible**, as additional units can be provided to increase output to meet increased demand. But it is **very expensive** on diesel fuel which has to be transported long distances - so the recurrent operational costs are very high, which has an impact on the cost of electricity to the consumer.
- 9.7 Location of the power station needs to consider:
- Plentiful water supply for cooling generators
 - Easy delivery of fuel supplies
 - Impact of generator noise on adjacent development
- 9.8 GoSS is interested in developing **hydro-electric power**. The potential of the River Nile has been known for a long time - feasibility studies were carried out on the Fula Rapids, south of Juba, in the early 1970s. But the remoteness of the location allied to insecurity problems during the period of conflict meant that the high capital development costs could never be justified.
- 9.9 New feasibility studies are being undertaken - if these studies deliver positive results, it is hoped that hydro-power will be available some time before 2020. This will initially serve Juba and its environs; but in the long-term it is hoped to extend distribution through a power grid to other towns in the South.
- 9.10 **Solar and wind power** are not viable at present for large scale urban power supply, although they could be useful for individual institutions. The technology is not yet sufficiently advanced or cheap enough to meet the demand of towns the size of State capitals.

Distribution

- 9.11 The distribution of power supply is typically done by overhead cable attached to reinforced concrete or wooden poles. It is basically *a flexible network* - the power goes wherever supply is needed. So power supply does not have much influence in shaping the form and direction of urban development, unlike water supply or drainage.
- 9.12 Underground lines are only justified in exceptional circumstances because of the relative cost.

Domestic supply highly valued by low-income groups

- 9.13 Studies show that electric power in the home is a highly valued commodity for low income households. Electric light is seen to bring *huge benefits for social and commercial life*.
- 9.14 For those with no generator, it reduces the inconvenience and regular cost of buying candles, paraffin/kerosene for lamps, batteries for torches and radios. It is also highly valued for facilitating reading and studying after dark.
- 9.15 *Lighting of public areas* (streets, footpaths, local markets, recreation areas etc) is also highly valued, for the improved conditions for evening/night-time social and commercial activities, and for the increased sense of security.
- 9.16 In brief, electricity makes life after dark much simpler and much safer.

Cost recovery

- 9.17 The basic principle is that those who receive electricity (as with all public utilities) are required to pay for what they consume. Payment is necessary:
- to ensure cost-effective operations of the supplier agency
 - to encourage economic usage and discourage waste
- 9.18 A variable tariff structure can be used for *cross-subsidy*: Many low-income households will find it hard to pay the full commercial rate for power supply, even if their consumption is very low. The tariff structure can be designed in price bands according to the type of supply and volume of consumption. In this way, higher volume consumers pay a higher rate per kWh (kilowatt hour), which is used to subsidise lower-income groups are usually low volume users.

NRECA Pilot Project in Yei

- The National Rural Electrical Cooperative Association (NRECA) is a service organisation from USA that promotes cooperative consumer-owned electric utilities and the consumers they serve.
- The organisation has received funding from USAID since 2004 to undertake projects in Southern Sudan.
- NRECA has trained local workers in Yei, Central Equatoria State, in a wide range of skills to build and operate a small power utility.
- Local crews erected the electrical distributions lines, constructed the substation, erected the powerhouse, and now operate the system.
- More than 17,500 people directly benefit from a reliable supply of electricity to residences, businesses, and public institutions, which has raised the standard of living for all residents of Yei.
- The installation of street-lighting has been a key factor in increasing public safety, reducing violent crime activity, and fostering business.
- The pilot project is part of USAID's Southern Sudan Rural Electrification Program, implemented.