DISTRIBUTION DEVELOPMENT AND REHABILITATION PROJECT OF THE C.E.B.

By

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1. Introduction :

1.1. General

After the high rate of growth of electrical power and energy demand from 1977 onwards, power shortages were anticipated and major capital investments were first committed to generating plant. These have resulted in the commissioning of two phases of gas turbines adding upto a total of 120 MW (in 1980 - 1982) and a diesel generating station of 80 MW in 1984 with respect to urgently required thermal plant. Also investments in the major accelerated Mahaweli Power Projects have also been made and generation of power and energy from these are also being gradually brought into the system with Victoria (3 x 70 MW) already commissioned and Kotmale (2 x 69 MW) presently being commissioned into service. Along with increased generation, transmission facilities too were strengthened and developed by World Bank loan Power Project 6 and Power Project 7.

The low and medium voltage distribution development has invited the least attention in the recent past. With the result increased demands arising from additional houses, industries and commercial establishments as well as increased domestic and industrial equipment that were installed in the existing establishments have had to be supplied with electricity on virtually the same distribution lines. The result of this are manifold and the following summeries a few of them :—

(*a*) overloading of distribution lines and poor voltage conditions, particularly at peak load times.

(*b*) increased technical losses due to higher electrical power and energy being transported on the same lines. Since losses increases as the square of the load current the rate of increases of losses have been considerably high. Further much of the high load growth have occured in areas which already have a high load concentration thus aggravating the problems even more.

(*c*) consequent to the increased loadings on existing distribution facilities many distribution lines which were capable of being fed from more than one source have now been restricted to one feeding source only. This has resulted in increased outages and lower system reliability in many important areas. These additional outages not only cause a financial loss to the CEB but a much greater economic loss to the country.

(*d*) the high loading level on distribution lines as well as equipment such as transformers and switchgear has resulted in a reduction of plant reliability and expected life times. The heating effect caused by high loading levels in the system has had detrimental effects on poorly constructed conductor joints contacts *etc.* The losses caused by damages to equipment had also thus been quite considerable. The 'rehabilitation' component of the project is the result of this overloading situation as well as the lack of suitable material stock for maintenance operations.

1.2 Present System Loss Levels :

The order of magnitude of the present system loss levels are approximately as given below :—

	Energy loss		*Peak time Power Loss*	
	% of gross generation	*% of through put*	*% of gross generation*	*% of through put*
Generation station auxiliaries and gen. transformers ...	1	1	1.5	1.5
Transmission systems and grid substation transformers ...	4	4	6	6
M. V. Distribution system ...	7	8	11	12
Distribution transformers ...	2	2	2	2
L. V. Distribution ...	1	8	3.5	10
Non-Technical	1		2	
	16%		26%	

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SRI LANKA ENERGY MANAGER S' ASSOCIATION INSTITUTIONAL MEMBERSHIP

Mem. No.	*Name of Organisation*
IM01	— Pugoda Textile Mills, 422, Galle Road, Colombo 3.
IM02	— Hotel Lanka Oberoi, 77, Steuart Place, Colombo 3.
IM03	— Government Owned Business Undertaking of Ceylon Oxygen Ltd. 50, Sri Pannanda Mawatha, Colombo 15.
IM04	— National Paper Corporation, P. O. Box 1367, Colombo 2.
IM05	— CTC Services Ltd., 29, Horton Place, Colombo 7.
IM06	— Hotel Ceylon Intercontinental, 48, Janadhipathi Mawatha, Colombo 1.
IM07	— Lever Brothers (Ceylon) Ltd., 258, Grandpass Road, Colombo 14.
IM08	— Associated Motorways Ltd., Nagoda, Kalutara.
IM09	— Richard Peiris & Co., Ltd., 69, Hyde Park Corner, Colombo 2.
IM10	— Sri Lanka Cement Corporation, 302, Galle Road, Colombo 4.
IM11	— Industrial Development Board of Ceylon, 615, Galle Road, Katubedda, Moratuwa.
IM12	— Ceylon Petroleum Corporation, P. O. Box 634, 113, Galle Road, Colombo 3.

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The above values are overall figures at each voltage level. If individual feeders are examined we would find some items at very high losses while a number of lines at low loading levels would have low losses.

2. System studies and organisation arrangements :

With a view to rectifying the high loss levels and deficiencies of the Distribution network, extensive system studies have already been carried out and a project prepared for early funding by the World Bank. Data on the C. E. B. Distribution network in most of the heavily loaded areas have been collected and this data has been subject to system studies using a digital computer. The software available provides the planner with state of the art techniques which enable quick determination of load flow results at varying time periods switching conditions as well as the study of system additions such as capacitors. These studies have produced proposals which would uprate the system network to the required technical and economic standards.

The main components of the proposed project are as follows :—

(*a*) Introduction of thick gauge or "backbone" system of medium voltage feeders which will serve as an "express way" to reduce the overloading conditions of the existing network.

(*b*) Reconductoring of lines to higher cross sections.

(*c*) Uprating certain medium voltage sections from 11 kv. to 33 kv.

(*d*) Installation of capacitors for power facto improvement.

(*e*) Reduction of Low voltage coverage of transformers by decentralising the L. T. network.

The benefits of the above improvements would consist mainly of reducing system losses and increased reliability by the ability to feed system loads from more than one feeder source. Studies indicate that the return on investments is extremely high and the pay back periods often is in the region of about 2 to 3 years. The total cost involved in the project now been formulated is in the region of Rs. 1000 million and World Bank funding for the project is expected to be obtained shortly.

In the next issue we shall discuss methods used in technical and economical evaluation of the new proposals.