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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Parliamentary Standing Committee on Public Works

REPORT

relating to the proposal to construct

STAGE 5 EXTENSIONS

of the

Stokes Hill Power Station, Darwin

(SIXTEENTH REPORT OF 1971)

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

STOKES HILL POWER STATION
DARWIN -
STAGE 5 EXTENSIONS

R E P O R T

By resolution on 14 October 1971, the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report to the Parliament, the proposed construction of the Stage 5 extension of the Stokes Hill Power Station, Darwin.

The Committee have the honour to report as follows:

THE REFERENCE

1. The proposal submitted to the Committee comprises:
 - provision of a 23.5 MW turbo alternator set, an oil fired boiler, auxiliary plant, a unit transformer and switchgear;
 - augmentation of the cooling water system including extensions to the pumping station and the main cooling water pipelines;
 - construction of a stores building;
 - extension of the office annexe to provide adequate amenities for employees; and
 - improvements to fire protection, airconditioning and site facilities and provision for inspection and testing equipment.

2.

2. The proposal will increase the installed capacity of the Stokes Hill Power Station from 70.5 MW to 94 MW and the firm capacity from 47 MW to 70.5 M.W.

3. The work is estimated to cost \$5.85 million.

THE COMMITTEE'S INVESTIGATION

4. The Committee received written submissions and drawings from the Northern Territory Administration and the Department of Works and took evidence from their representatives at a public hearing in Canberra. Written submissions were also received from the Darwin Air Pollution Committee and one private witness.

5. We inspected the Stokes Hill Power Station including the areas of the proposed work when in Darwin recently on other business.

STOKES HILL POWER STATION

6. In 1958, the Committee investigated and reported on the proposal to construct the first stage of the Stokes Hill Power Station. The plan then envisaged a station of about 45 MW capacity to be constructed in stages as the demand required. Stage 1, with a capacity of 15 MW (two 7.5 MW sets) was constructed following the Committee's report, and commissioned in 1962 at a cost of nearly \$4 million. Subsequently, stages 2 and 3 each consisting of a 16 MW turbo alternator were constructed and commissioned. Their total cost was \$4.7 million.

7. In 1967, the Committee recommended the construction of the Stage 4 extension at a cost of \$4.6 million. At that time, Stage 4 was planned as a further 16 MW turbo alternator set and included building and

site works to provide for the later installation of three further sets which would be the ultimate development of the station. The Committee reported that there was a need to have the additional generating capacity operating by 1971 and that on the evidence available, it would probably be necessary to develop the station to its ultimate capacity by 1979. Within this outline, it was planned to commission the sixth set late in 1974 and the seventh and eighth sets early in 1979.

8. However, as a result of favourable tendering for Stage 4, it was possible to obtain a 23.5 MW set for little more than the cost originally estimated for the 16 MW set and because of the increased load growth which had occurred after the hearing, this alternative was approved with the Committee's support. Stage 4, which is now about to be commissioned, will bring the installed capacity of the station to 70.5 MW and the firm capacity to 47 MW.

9. Ultimate Development The outline plan explained to the Committee is now based on the station having eight generating sets with an installed capacity of 141 MW. Each of the last three sets is planned to be of 23.5 MW capacity.

10. The need for additional capacity after the present work is completed will be dictated by the rate of load growth but on present expectations and disregarding exceptional industrial or urban development, it is expected the last set would need to be in operation by about 1979. At that point, the Stokes Hill facility will be fully developed and subsequent power generation will need to take place elsewhere. We noted that planning of a second station has advanced to the stage where recommendations on a site are expected to be made by mid-1972.

THE NEED FOR ADDITIONAL GENERATING CAPACITY

11. The Load Growth Factors influencing the demand for electricity in Darwin are the steadily increasing population, the expansion of Government services, increasing industrial and commercial activity, developments in the pastoral, mining and agricultural industries and the increasing popularity of Darwin as a tourist centre. Besides this sort of growth, there have been other factors such as the more widespread use of air conditioning in private buildings and in public offices and schools.

12. In the period between 1966 and 1970, Darwin's population increased from over 21,000 to almost 33,000. Between 1966/67 and 1970/71, the number of electricity consumers rose from 5,287 to 8,680 and in the same period, the sales of electricity rose from 66 million KWH to 130 million KWH. The peak load in 1971 is expected to be close to the 31 MW forecast at the hearings on the 1967 reference.

13. The Committee were told that a review of the load growth over the past few years has shown that it is increasing at an overall rate of 17% compounded annually and we believe that this is a realistic basis for predicting load growth up to at least 1976. On this basis, it can be predicted with some confidence that the station's firm capacity of 47 MW, following the completion of the Stage 4 extension later this year, will be reached by the peak load by 1974.

14. The Committee's Conclusions The Committee concluded that in the light of recent trends in the load growth, known and expected building and urban developments, and other factors influencing the demand for electricity, it is reasonable to plan for the future on the basis of a

growth rate of 17% per annum. This leads to the second conclusion that there will be a need for additional generating plant to be operating at Stokes Hill Power Station by 1974.

15. As the submission of the Department of Works suggests that it will not be possible for the firm capacity of Stokes Hill to be supplemented before 1975, there will probably be periods before the new plant is operating when power restrictions may be necessary.

THE SITE

16. The previous reports of the Committee have discussed the site and noted criticism directed at its location. The weight of previous evidence favours the present site as the most suitable for the immediate purpose and for future expansion of the station. We agree with this conclusion and that it is appropriate to continue the development of the Stokes Hill Station to its full capacity.

METHOD OF GENERATION

17. In its 1958 report, the Committee discussed the method of generating electricity at Darwin. The suitability of diesel engines, gas turbines, hydro-electric power, atomic energy and oil fired steam turbine plant was examined and it was agreed that the most economic and practicable method for Darwin at its stage of development was generation by oil fired steam turbine plant. It was noted subsequently that this type of boiler plant could be readily converted to use natural gas instead of oil.

18. Natural gas is still not yet available, but it was noted that should an assured supply become available, it would be possible to convert

the existing and proposed oil fired plant to the use of gas. Meantime, we endorse the proposed use of oil fired equipment using furnace oil for the Stage 5 extension of Stokes Hill Power Station.

THE PROPOSED WORK

19. Plant The plant proposed for the Stage 5 extension is a 23.5 MW turbo alternator with an associated outdoor oil fired boiler, auxiliaries, unit transformer and switchgear. In addition, the present cooling water system requires augmentation to cater for Stage 5 and future extensions and major valves associated with the system are overdue for replacement. The oil burning equipment will incorporate anti-pollution refinements.

20. Building Work As there is insufficient storage space at the station, stores and major plant spares have been spread over three other storehouses in the Darwin area. Their space is becoming increasingly crowded and dispersal over the several locations is causing administrative inefficiencies. Accordingly, a brick and steel framed building providing an area of 6,000 sq. ft is to be constructed and will include an air conditioned office and a precision parts store.

21. Present permanent staff amenities are limited to toilet and wash rooms, and facilities for day labour employees are inadequate. It is therefore proposed to extend the office building annexe on the east side of the turbine hall to house toilets, a locker room, wash and shower rooms, a mess room and kitchen facilities to provide for the ultimate station strength of 160 employees.

22. Other Work Additional fire protection measures are required to bring the installation to the necessary standard. Improvements are also required to the air conditioning to cater for the increased amenities, office and laboratory needs. Further fencing and site works will be included and also provision for inspecting and testing equipment.

23. Committee's Conclusion The Committee recommend the construction of the work in this reference.

ESTIMATE OF COST

24. The estimated cost of the work when referred to the Committee was \$5.85 million made up as follows:

	\$
Augmentation of cooling water system	850,000
Installation of 23.5 MW turbo alternator and associated equipment, building work, engineering services and site works	<u>5,000,000</u>
	<u>5,850,000</u>

PROGRAMME

25. During the preparation of documentation and specifications for Stage 4, the need to commission Stage 5 was anticipated and an option of a further generating set was included in the contract but this has now lapsed. However, due to the urgency of the work, the Committee noted

that it is proposed to negotiate up-to-date prices with the contractor for the Stage 4 extension for both the generating plant and the cooling water system. A contract for the augmentation of the cooling water system is thereby expected to be let shortly after approval of the work is obtained and the work completed by 1973. The contract for the generating plant is planned to be let in July 1972 and the plant is to be commissioned in February 1975. Tenders for the stores building and other works will be called separately in December 1972.

AIR POLLUTION

26. Both of the written submissions made to the Committee requested that efforts be made to minimise the pollution of the Darwin city area by smoke emanating from the Stokes Hill Power Station. On examining the Department of Works' witnesses on this matter, we found that

- the mechanical equipment used to control the emission of smoke is considered to be as effective as it is possible to make it; and
- the standards specified for the fuel oil used at Stokes Hill are designed to minimise pollution nuisance as far as practicable.

27. We concluded that the Department should continue to exercise care in operating the station to ensure that smoke emissions are reduced and maintained at the lowest levels practicable. We also believe that in specifying standards for the purchase of fuel oil, efforts should be made to obtain oil with a minimum sulphur content, consistent with economic operation, preferably from Australian wells.

RECOMMENDATIONS AND CONCLUSIONS

28. The summary of recommendations and conclusions of the Committee is set out below. Alongside each is shown the paragraph in the report to which it refers.

Paragraph

1. IT IS REASONABLE TO PLAN TO MEET THE DEMAND FOR ELECTRICITY IN DARWIN ON THE BASIS OF A GROWTH RATE OF 17% PER ANNUM. 14
2. THERE IS A NEED FOR ADDITIONAL GENERATING PLANT TO BE OPERATING AT STOKES HILL POWER STATION BY 1974. 14
3. IT IS APPROPRIATE TO CONTINUE THE DEVELOPMENT OF THE STOKES HILL STATION TO ITS FULL CAPACITY. 16
4. THE COMMITTEE RECOMMEND THE CONSTRUCTION OF THE WORK IN THIS REFERENCE. 23
5. THE ESTIMATED COST OF THE WORK WHEN REFERRED TO THE COMMITTEE WAS \$5.85 MILLION. 24
6. THE DEPARTMENT OF WORKS SHOULD CONTINUE TO EXERCISE CARE IN OPERATING STOKES HILL POWER STATION TO ENSURE THAT SMOKE EMISSIONS ARE REDUCED AND MAINTAINED AT THE LOWEST LEVELS PRACTICABLE. 27
7. EFFORTS SHOULD BE MADE TO OBTAIN OIL WITH A MINIMUM SULPHUR CONTENT, PREFERABLY FROM AUSTRALIAN WELLS. 27


(C.R. Kelly)
Chairman

Parliamentary Standing Committee
on Public Works,
Parliament House,
CANBERRA, A.C.T.
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