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SPEECH BY MR CHIN HARN TONG, PARLIAMENTARY SECRETARY,
MINISTRY OF HOME AFFAIRS, AT THE OFFICIAL OPENING OF
THE NEW POWER SYSTEM CONTROL CENTRE AT AYER RAJAH INDUSTRIAL ESTATE
ON FRIDAY, 20 JULY 1979 AT 5.00 PM.

In the past 25 years, the maximum demand of the Power System in Singapore has grown steadily from 50 MW in 1954 to 1000 MW in 1979, a twenty-fold increase. In terms of electrical energy, more than 6,000 million kWh can be expected to be generated this year, compared to just over 200 million kWh in 1954.

Up to 1965, there was no separate control centre for the electricity generators. The system was relatively small and uncomplicated, as there were then seven 25 MW generators at the Pasir Panjang 'A' Power Station, and the Control Room for these was adequate to supervise the 22kV transmission operations. However, in 1965 when the Pasir Panjang 'B' Power Station was introduced, four new 60 MW generators were in operation, and transmission was stepped up to 66kV. This required a System Control Section at the Pasir Panjang 'A' Power Station which controlled network operations and co-ordinated loading of the Power Stations. From this Control Section, electromechanical supervisory equipment was operated manually which could monitor readings from Sub-stations and which could also affect remote switching of circuit breakers there. By 1971, another four 60 MW generators were installed at the Jurong Power Station Stage I.

The increasing demand in Singapore required even larger unit size generators. Thus, by 1974, three 120 MW sets were put into operation at Jurong Power Station Stage II, and another three at the Senoko Power Station (Stage I) in 1976. Transmission voltage for the latter three 120 MW sets was raised to 230kV.

The Senoko Power Station Stage II is the latest additional source of power supply with even bigger generators, featuring three 250 MW sets. The first was commissioned in October 1978, the second

in April /2.

in April this year and the third is expected to be in operation in three months' time. Plans are also afoot to extend this series by another two 250 MW sets under Stage III of the Senoko Power Station, scheduled for completion in 1984.

Thus, over the past 25 years, the generator size has increased progressively from 25 MW to 250 MW and transmission voltage from 22kV to 230kV. This vast expansion has necessitated a new Power System Control Centre. The task of planning this was undertaken by the Electricity Department, and a small team of engineers was sent abroad to understudy such Centres in various countries. After intensive study, they recommended that such a Centre should incorporate a computer system and colour video display units in conjunction with modern electronic supervisory controls. The contract for this installation was awarded to Brown Boveri of Switzerland in April 1976, and this Centre here today is the successful outcome.

The main features of this Centre are the prominent Mimic Board showing the state of the networks; the Video Display Units on which additional information of occurrences can be called forth; and the twin computers, one of which only is operating at any one time, the other acting as a stand-by. Not so obvious are the micro-processors or mini-computer modules dispersed at remote 66kV and 230kV Sub-stations and other Power Stations. These are fundamental to electronic supervisory control as they are able to communicate (in code through pilot wires) with the master micro-processors in this Centre which in turn are linked to the main computer.

The total cost of such equipment at this Centre and the connections to the Sub-stations and Power Stations is over eight million dollars. Such a sophisticated system provides the control engineer on duty the latest information on the Power System. For example, if there is a disturbance at any of the major locations shown on the Mimic Board, he can call up a coloured circuit diagram of the remote station where the alarm has occurred to see what has happened. He will be able to switch on or off circuits as required by remote control at any of the 47 (44 66kV and three 230kV) Sub-stations which are all unmanned. This is done by push-button manipulation of the video diagram at the operating console. Switching operations, alarms occurring and operator actions are all automatically and sequentially logged; this is in addition to the normal routine periodical recording of operating data. This new system, it

is hoped, will /3.

is hoped, will improve co-ordination and to speed up the restoration of electricity after major failures in the Power System.

This Control Centre here at Ayer Rajah has in fact been operational from 17th March 1979, taking over the functions of the old Pasir Panjang Centre. A separate Distribution Control Room is also provided here. The supervisory control equipment from the old centre has been salvaged and installed here to provide monitoring and remote switching of about 10 per cent of the 22kV Distribution Sub-stations. As there are about 1,700 6.6kV and 600 22kV Sub-stations, it is not economical to provide these with the sophisticated and costly supervisory controls used for the higher 66kV and 230kV transmission systems.

When this Centre is fully functional, system frequency will be under automatic computer control to minimise deviations from the 50 cycles per second. Another special computer programme will enable control of the loading of generators at the Pasir Panjang, Jurong and Senoko Power Stations. This automatic control will match loading with the fluctuating electrical energy demands throughout the day, thus minimising total fuel consumption. This computer programme, called the Economic Load Despatch Programme, recalculates allocations every five or 10 minutes, taking into account the variations in system demand, efficiency of the various sets (and any limitations that may be placed on them), and other network constraints existing at that time. This Programme also allows for the exclusion of particular sets or have their participation adjusted. In this way, which otherwise would not be possible using human judgement, the most economic use of fuel oil is achieved. When we consider the cost of fuel oil used in Singapore during a working day is approximately one million dollars, this optimisation on fuel oil consumption can in the long run save us considerable sums of money.

All our fuel oil is imported at international market prices. Increases in the price of oil are bound to be reflected in rising charges for electrical energy generated by the PUB. The Board, by computerising its generating system, seeks to eliminate the element of human error, reduce wastage and improve efficiency. But there are definite limits to what the Board can do and has done to save energy and reduce the increase in charges for electrical energy.

The general public and industries can and must help the PUB in its deliberate efforts to economise on the use of fuel oil by cutting down and restraining their consumption of electrical energy.

Finally, I have pleasure in officiating at today's formal opening of the New Power System Control Centre - I now officially declare it open.

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