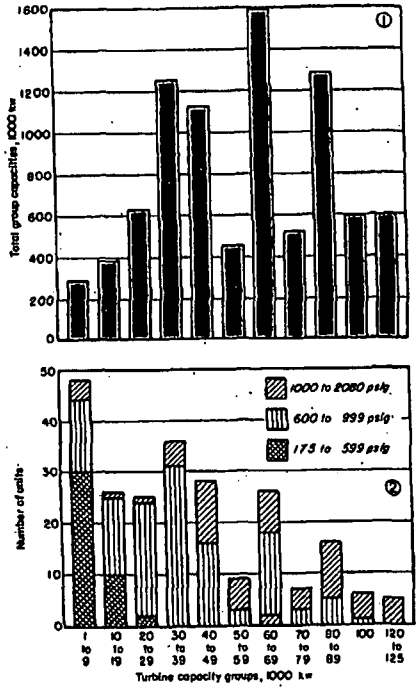
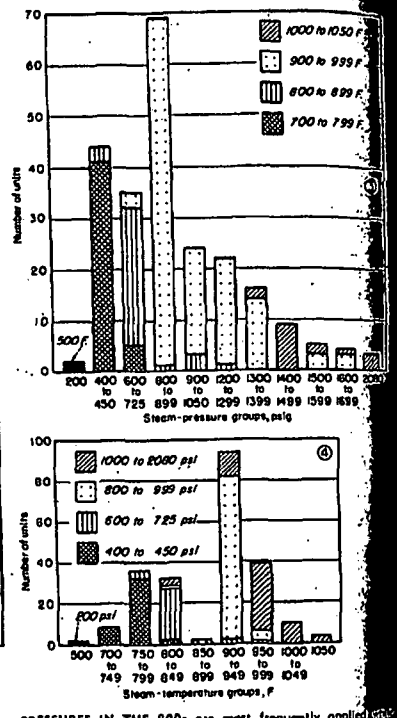


GROUPING BY CAPACITIES shows the 60- and 80-mw turbines contribute largest blocks of kw; units under 10 mw lowest kw



PRESSURES IN THE 800s are most frequently applied with temperatures ranging from 900 to 949 F strongly predominate

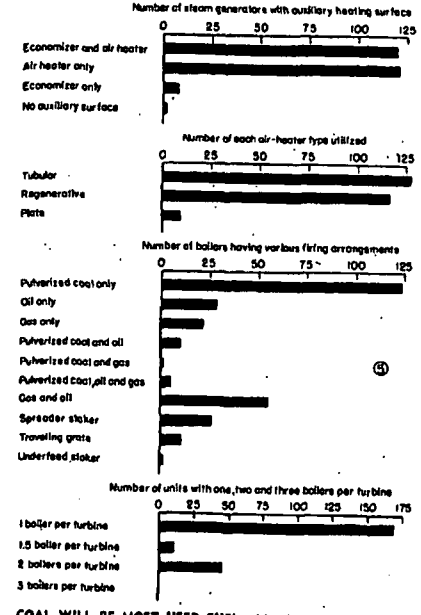
Survey Spots Utility Design Trends

▶ ROCKETING NEEDS for more generating capacity are strikingly shown by the record number of returns received in POWER's present steam central-station survey. In the tables on pp 92-97 are broad details of 233 units installed since January 1947 and projected up to 1951. These units total close to 8.5 million kw, representing about 55 to 60% of announced expansions. POWER's 1947 Survey, published in the June, 1947 issue, reported on 79 units representing almost 3.5 million kw for the same period as the current survey. Efforts were made to avoid reporting the same installation in both surveys. The two studies together give information on about 75 to 80% of new units.

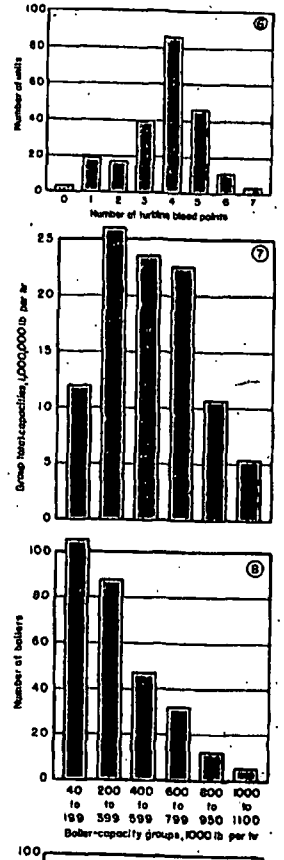
New Practices. The tremendous expansion all systems are experiencing, coupled with inflated prices, leads naturally to emphasis on designs that will hold down over-all costs. About two-thirds of the reported units will use steam pressures of 800 psig and above, and temperatures of 900 F and above. Only an insignificant number of boilers do not use either or both economizer and air heater; these are in small municipal plants.

The predominant use of one boiler per turbine directly reflects the cost-cutting aim as well as the increased reliability of equipment operation. No information was collected on the number of pure single-unit installations. Probably most of these units are interconnected with others in the same station at the steam header or boiler-feed header.

The trend to utilization of four extraction points and more continues. Most of the plants using less than four are small units operating at pressures of 450 psi and below. About 65% of the reporting number of boilers will have full-load release rates less than 25,000 Btu per cu ft per hr and 45% will be less than 20,000 Btu. While this factor depends largely on the furnace design, it nevertheless shows an allowance for



COAL WILL BE MOST USED FUEL with almost universal application of air heaters; note high use of 1 boiler per unit



fuel quality to the poorer side. The present group of installations includes eight topping turbines, only a small percentage of the entire group of 233; last year's survey had five topping out of 81 units.

A definite try for increased over-all economy appears in the 12 reheat installations reported, most of them at initial and reheat temperatures of 1000 to 1050 F, reheat being applied for its better heat rate rather than moisture control at turbine exhaust.

Of 167 turbines 20,000 kw and larger, only three are air cooled, the remainder using hydrogen. Of a total of 233 units, five are cross-compound with the high rotor turning at 3600 rpm and the low rotor at 1800 rpm; there are 17 units running at 1800 rpm and one at 1500 rpm, rest operate at 3600 rpm. By a vast majority most of the installations will use electrically driven auxiliaries, with perhaps a standby turbine-driven feed pump. Only 16 have turbine-driven pumps exclusively. For speed control on fans and pumps a total of 80 hydraulic couplings and 25 magnetic couplings were reported.

Radical Departures. Projected installations that are radically different and will be watched with interest by the power field are (1) the mercury-steam station being installed by the Public Service Co of New Hampshire (2) the simple-cycle gas turbine with exhaust heat recovery being installed by the Oklahoma Gas and Electric Co. The first installation will consist of two "standard" 7500-kw mercury turbines and boilers supplying steam to a 25,000-kw steam turbine, making a total unit capacity of 40,000 kw.

The gas turbine reported in Sept 1948 POWER, pp 64-71, is a 3500-kw unit working with existing steam-station heat balance to raise station capability over 6000 kw and improve total heat rate.

ADDITIONAL DATA appear in Fig. 6-9 at right; note particularly the conservative heat releases in Fig. 9, showing provision for changes in coal qualities