Part 8

RENEWABLE ENERGY SOURCES

8.1. Geothermal power plants (GPPs)

8.1.3. Geothermal power plants at the fields of steam-water mixes or geothermal brines with condensing turbines and single –or repeated expansion of the geothermal fluid

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In case temperature of the separated water is rather high (higher than 100^0C) at the fields of steam-water mix, the additional steam can be obtained by expansion [pressure drop in expander *9* (fig.8.3)]. The obtained steam flows into intermediate turbine inlet. It allows getting the additional work and, hence, increasing the efficiency of power installation. Theoretically, there can be several similar cascades. Practically, the opportunity of applying such schemes is restricted by scaling in elements of the equipment, resulting from increase in salt concentration that is higher than the maximum solubility. At the fields of steam-water mix, deposits of silicic acid are, firstly, formed. Its solubility decreases very fast at temperature drop. At the fields of geothermal brines, mined from carbonate collectors (North Caucasus) at expansion of brines, the dissolved CO_2 is emitted. That leads to carbon dioxide debalance and formation of calcite and magnesite deposits, etc. Therefore, application of schemes with expanders is possible only at absence of massive scales or using regular cleaning of equipment.

Expanders are comparatively cheap volume apparatuses. That is why their application does not contribute much in investments increase, making about 1000 dollars per kW.

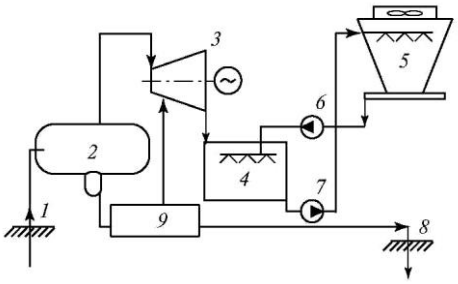

Fig. 8.3. Flow diagram of GPP with condensing turbine and expansion of the geothermal fluid:
1—8 — the same as in fig.8.2; *9* — expander