

## ADVANCED TECHNOLOGIES AND POWER INSTALLATIONS FOR THERMAL AND ELECTRIC ENERGY GENERATION

### 6.3. Heat and power supply units of low capacity

#### 6.3.2. Basic principles of choosing the unit capacity at small cogeneration heat power plants

*Ilyin E.T. CJSC "Complex energy systems"*

The basic principles are as follows:

1. Provision of turbine operation only in the combined cycle mode during the whole calendar year.
2. Choosing only backpressure steam turbines as they provide a maximum efficiency of fuel heat utilization. Such turbines are significantly cheaper than the ones with condensers. Besides, application of backpressure turbines results in significant reduction of costs for technical water supply system construction, and also auxiliary needs as in this case there are no circulation pumps. Such turbines have small overall sizes, even providing high capacity that simplifies their installation in the operating boiler-houses.
3. Increase in reliability of the newly built mini CHPP operation due to installation of two or more turbines instead of one.
4. A choice of initial steam parameters should be determined by the maximum power generation, achieved at heat supply from the turbine with required parameters.
5. A number of boilers and turbines should be the same or one stand-up unit should be provided. Besides, a choice of a type and steam productivity of the boiler should be guided by the requirement that application, for example, in the same boiler-house of P-type water heating boilers of 30, 50 and 100 Gkal/h together with steam boilers should not arouse a necessity of constructing the buildings of dif-

ferent height, resulting in increase of construction work costs.

6. Complete utilization of flue gas heat within the whole season in case of boiler-house building-up with gas turbines and application of water heating boilers as heat recovery steam generators (HRSG) for GT exhaust gases. Besides, it is reasonable to provide that GTU and water heating boiler can form a single power unit. The conducted analyses showed that, for example, water heating boilers of KVGM-100 and KVGM-180 are advisable to complete with GTU-16 and GTU-25, correspondingly, manufactured by Ural turbine motor works or with GTU having similar exhaust gas flow rates. When using a water heating boiler only as HRSG without fuel supply to the boiler combustion chamber, its heat efficiency may go down to 20...25% of the initial one. Overload modes can be used for the boiler heat efficiency increase, i.e. supply of additional fuel to the boiler combustion chamber with its following combustion in GT exhaust gases. Such scheme allows to improve an efficiency of fuel combustion heat utilization.

7. Consider that basic factors, determining a choice of a type and capacity of the unit, are total heat production at the boiler-house and heat loads of hot water supply, in particular.