

The invention relates to branch of heat power engineering and can be used for reversible transformation with heat pumps of electric energy to heat in heating and heat supply systems. In the method for reversible transformation of electric energy to heat in which electro-chemical regeneration takes place in process of reaction of recombination of gases  $H_2$  and  $O_2$  in hydrogen-oxygen fuel cell with following supply of obtained electric energy and  $H_2O$  to electrolyzer with following electrolytic decomposition of  $H_2O$  to components – hydrogen and oxygen – with return of those in reversed direction, endothermic reaction of electrolysis of water is performed at temperature lower than temperature of environment and due to supply of heat that shifts heat effect of reaction, and due to additional electric energy from side source. Exothermal reaction – recombination of gases  $H_2$  and  $O_2$  is carried out at temperature of saturation of  $H_2O$  for its pressure in fuel cell and with obtaining there  $H_2O$  as of water vapor. Heat of exothermal reaction is taken off from fuel cell with heat carrier of heating system (or hot water supply). Heat carrier of heating system is heated to given temperature with hidden heat of phase transition at condensation in heat exchanger-condenser of saturated water vapor obtained in fuel cell; condensate  $H_2O$  from heat exchanger-condenser is fed to electrolyzer with pump operating from side source of electric energy, and heat of overheating of condensate  $H_2O$  formed is supplied through regeneration in counter-flow heat exchanger to products of low-temperature electrolysis (to gases  $H_2$  and  $O_2$ ) at their flow to fuel cell. Method for reversible transformation of electric energy to heat provides high effectiveness since practically reversible processes are used in it: low-temperature electrolytic decomposition of water (at voltage 1,23 Volt) and reaction of recombination of products of electrolysis ( $H_2$  and  $O_2$ ) in fuel cell (at voltage 1,162 volt for 100 °C) with replacement of 0,068 Volt from external electric power source only.