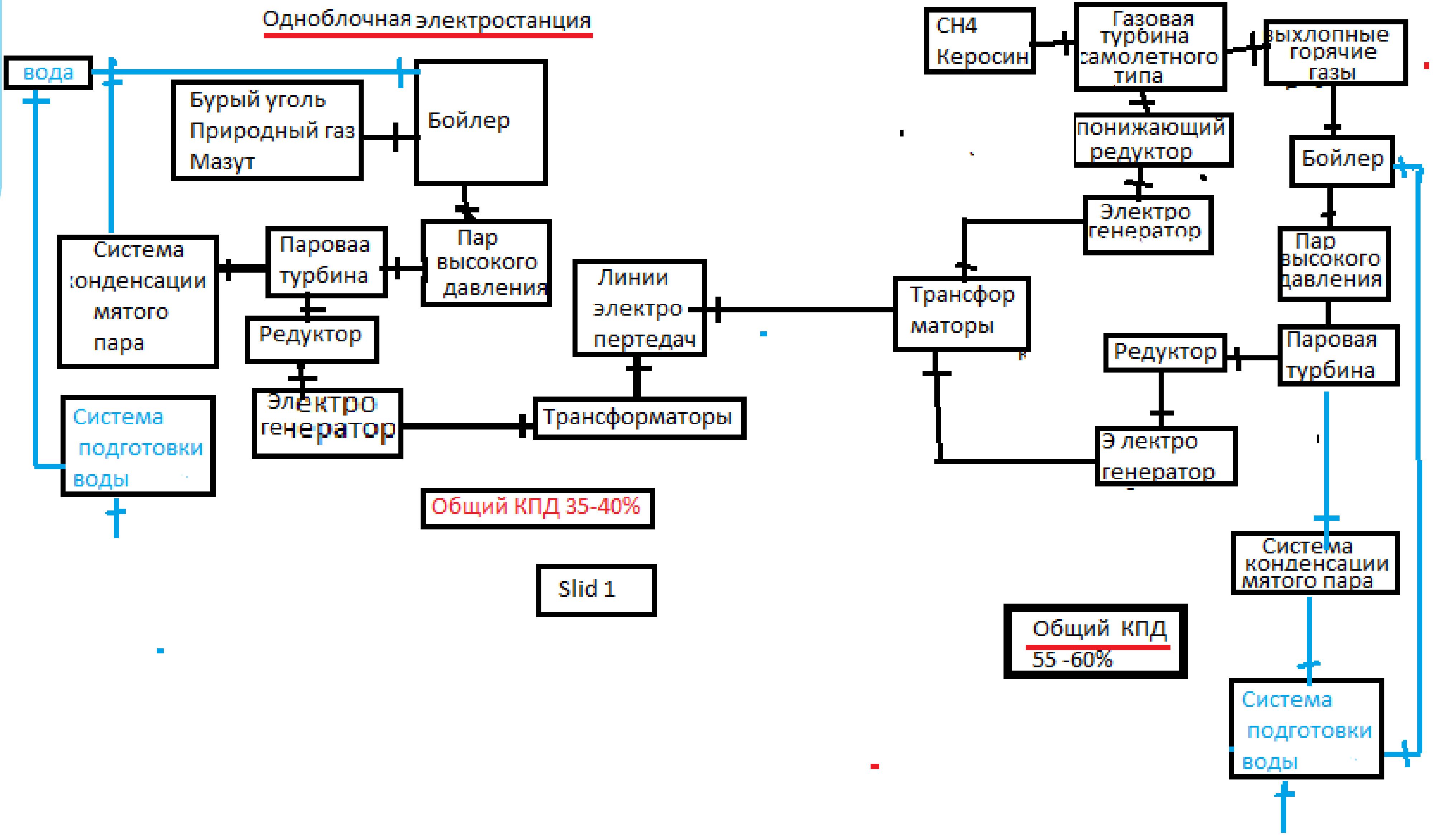
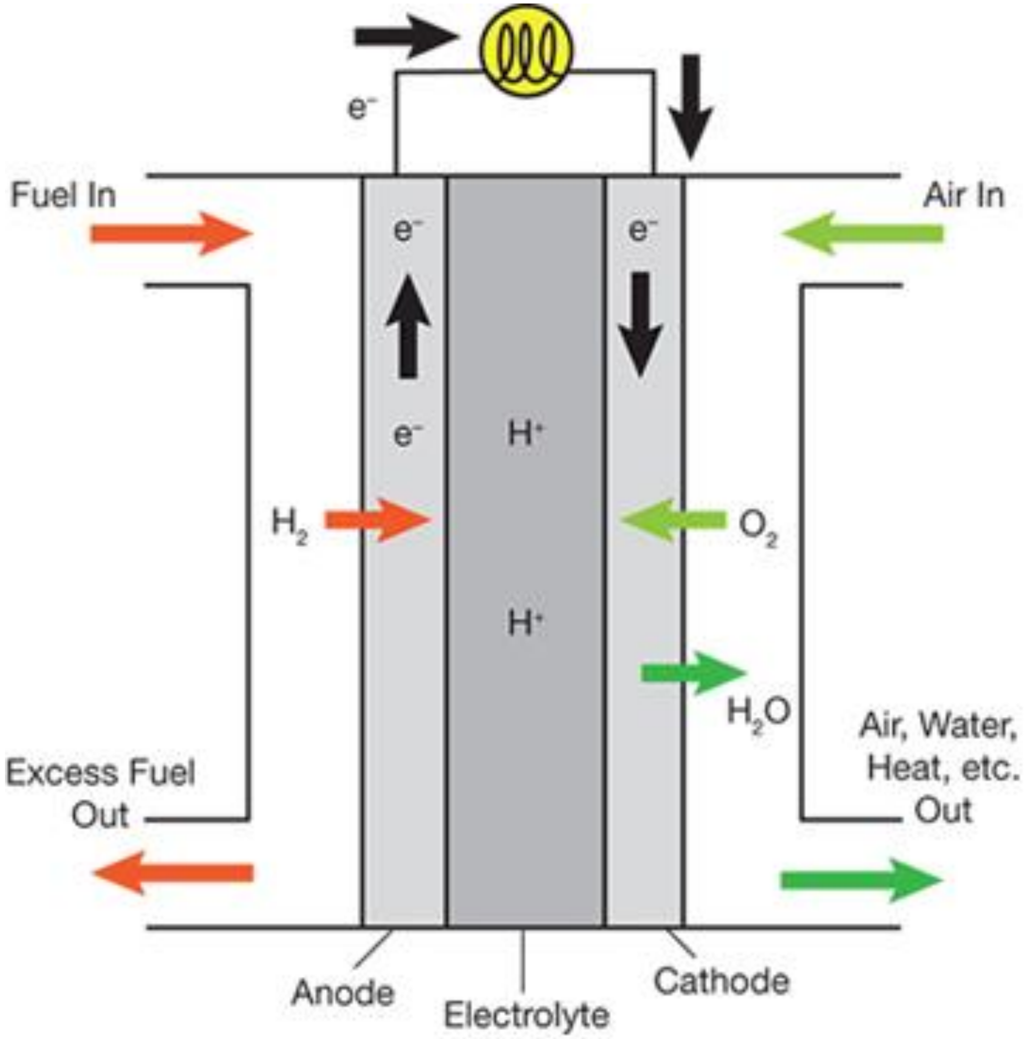
МАРК ЗАК

Преобразование химической энергии в электрическую

5 сентября 2018

Существующая технология преобразования химической энергии топлива в электрическую с помощью механических устройств. Двублочная электростанция.





▲ **Figure 1. Hydrogen enters the fuel cell and is oxidized at the anode to form protons. The electrolyte material conducts ions, but not electrons, so electrons are forced into the external circuit. At the cathode, oxygen is reduced to water**

▲ **Figure 2.** This 400-kW phosphoric acid fuel cell (PAFC) produces hydrogen onsite. Photo courtesy of Doosan Fuel Cell.

slide 3

▲ **Figure 3**. These 15-MW molten carbonate fuel cells (MCFCs) began operation in Bridgeport, CT, in 2013. Photo courtesy of Fuel Cell Energy.

Table 1. Fuel cells are characterized by their electrolyte and operating temperature, as well as other properties.

Fuel Cell Type	Electrolyte*	Operating Temperature	Stack Size	Efficiency	Applications	Advantages	Challenges
Polymer Electrolyte Membrane (PEM)	Perfluoro-sulfonic acid	<120°C	<1–100 kW	40–45%	• Mobile power • Portable power • Backup power	• Solid electrolyte • Low temperature • Quick startup • Rapid load following	• Expensive catalyst • Sensitive to fuel impurities • Relatively low efficiency
Alkaline (AFC)	Potassium hydroxide	<100°C	1–100 kW	60%	• Space • Military	• Low temperature • Quick startup	• Extremely sensitive to CO_2 in fuel and air • Electrolyte man-agement is needed
Phosphoric Acid (PAFC)	Phosphoric acid	~200°C	5–400 kW	40%	• Stationary power	• Combined heat and power (CHP) capable	• Expensive catalyst • Sensitive to sulfur in fuel • Long startup times
Molten Carbonate (MCFC)	Molten lithium, sodium, and/or potassium carbonate	600–700°C	300 kW	50%	• Stationary power	• High efficiency • Fuel flexible • CHP capable	• High-temperature corrosion • Long startup times • Low power density • Expensive
Solid Oxide (SOFC)	Yttria-stabalized zirconia	600–850°C	1 kW–2 MW	Distributed generation >50% Central >60%	• Stationary power	• Solid electrolyte • High efficiency • Fuel flexible • CHP capable	• High-temperature corrosion • Reliability • Long startup times • Expensive

* Conventional electrolytes are listed. Advanced electrolytes, such as alkaline exchange membranes, are an area of active research.


Спасибо за
внимание!!!