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КӨЛІК – ЭНЕРГЕТИКА ФАКУЛЬТЕТІ

«КӨЛІК ЖӘНЕ ЭНЕРГЕТИКАНЫҢ ӨЗЕКТІ МӘСЕЛЕЛЕРІ: ИННОВАЦИЯЛЫҚ ШЕШУ ТӘСІЛДЕРІ» IX ХАЛЫҚАРАЛЫҚ ҒЫЛЫМИ-ТӘЖІРИБЕЛІК КОНФЕРЕНЦИЯСЫНЫҢ БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ IX МЕЖДУНАРОДНОЙ НАУЧНО – ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ: «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ТРАНСПОРТА И ЭНЕРГЕТИКИ: ПУТИ ИХ ИННОВАЦИОННОГО РЕШЕНИЯ»

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Тематика статей и докладов участников конференции посвящена актуальным вопросам организации перевозок, движения и эксплуатации транспорта, стандартизации, метрологии и сертификации, транспорту, транспортной техники и технологии, теплоэнергетики и электроэнергетики.

Материалы конференции дают отражение научной деятельности ведущих ученых дальнего, ближнего зарубежья, Республики Казахстан и могут быть полезными для докторантов, магистрантов и студентов.

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мұндағы E_0 – стандартты жағдайларда (компоненттердің температурасы мен парциалды қысымдарында) ҚООЭ электр қозғаушы күшінің шамасы [1, 3], *Rg* – универсал газ тұрақтысы, *T* – температура; v_{fuel}, v_{prod}, v_{ox} – тиісінше отын, өнім және оттегі үшін стехиометриялық коэффициенттер, n_{fuel}, n_{prod}, n_{ox} – электрохимиялық реакция аймағындағы отынның, өнімнің және оттегінің концентрациясы.

Отын компонентінің шығыс және кіріс концентрацияларының қатынасына тең α отынын утилизациялау термодинамикалық тәсіл кезінде берілуі тиіс. Элементтің шығысындағы ауа және отын қоспасының құрамы α шамасы және компоненттер массасының тепе-теңдік теңдеулері бойынша есептеледі [1, 3].

Қорытынды**.** Дүниежүзілік зияткерлік меншік ұйымының деректері соңғы 15 жыл ішінде бүкіл әлемде ҚООЭ -не қызығушылықтың күрт өскенін айғақтайды. Қазіргі уақытта ҚООЭ технологиясының негізгі қиындықтары отын-элемент батареяларының жоғары құны және төмен ресурсы болып табылады. Қазіргі уақытта бүкіл әлемде электрод-электролитті құрастырудың наноқұрылымдарын өндіруді жетілдіруге және ҚООЭ -нің ең ұтымды конструкцияларын әзірлеуге бағытталған үлкен зерттеу жұмыстары осы проблемаларды шешуге бағытталған.

Электр энергиясын және сутегін көмірден өндіретін және экологиялық таза электр генерациясының, CO2 ұстап қалудың және көмірден сутегі өндірудің жаңа технологияларын сынақтан өткізу және оңтайландыру үшін ірі ауқымды инженерлік зертхана болатын қуаты 275 МВт станция құру көзделуде.

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IMPROVEMENT OF THERMAL SCHEMES IN THE DESIGN OF HEAT SUPPLY SYSTEMS IN NUR-SULTAN

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Humanity has used heat for its own needs since past eras. The way to get it developed from burning a fire in a cave to a nuclear reactor at modern nuclear power plants.

People have learned to convert heat into mechanical and electrical sources of energy. The modern world depends on the source of electricity. Electricity is universal, and it can be converted into various sources of energy.

Converting it to a variety of energy sources, transporting it over long distances, and not having a large volume of devices have a big impact on its use around the world.

Today, there are various ways to heat housing: electric heaters, mini-boilers, heat pumps, etc. However, in densely populated cities, the most effective method is considered to be district

heating. Therefore, to this day, thermal power plants (CHP) are still used to provide cities with heat and hot water.

The heat energy is sent from the CHP in the form of hot water and steam. For heat supply of large-scale industrial premises, steam is most often used. In addition, steam can be used by industrial enterprises for their technological needs.

However, the efficient transport of steam and hot water over long distances has its limits. Therefore, thermal power plants are not placed away from consumers who use thermal energy.

It should be noted that environmental indicators are getting tougher over time, which means that the requirements for the level of polluting waste of the center are getting tougher accordingly.

The level of residual emissions, in turn, depends on the type of fuel and the method of its combustion. The most efficient type of fuel can be considered gas. But it is considered more expensive in price than coal. Coal is the cheapest (including even a pre-combustion service) and the most common type of fuel.

The problem of all fossil fuels is their depletion, so today the most urgent problem in the world is the proper use of natural resources [1].

A heat supply system is a set of technical devices, aggregates and subsystems that ensure the preparation of a heat carrier, its transportation and distribution in accordance with the demand for heat for individual consumers. The latter are heating, ventilation and air conditioning systems, hot water supply, as well as technologies and installations of industrial enterprises. Heat supply systems are divided into centralized and decentralized. Centralized-large systems, the heat sources of which are thermal power plants or large boiler houses with high efficiency. For cities, decentralized heat supply systems usually include systems of microdistricts, blocks, or individual buildings with a heat capacity of less than 58 MW (50 Gcal / h), with heat networks extending 1-2 km with pipe diameters up to 300-400 mm; for settlements – systems that do not have heat networks. Autonomous heating units with a capacity of 20-40 kW, providing heating and hot water supply to one house or apartment, are essentially local heat supply systems. If the heating unit only provides heating for the building, it refers to local heating. Therefore, heat supply systems can be divided into centralized heat supply systems, decentralized and local, as a kind of decentralized systems [2].

To ensure the reliable functioning of the centralized heat supply system, it is built according to a hierarchical principle, in which it is divided into a number of levels. Each of them has a special task that decreases in importance from the top level to the bottom. The upper level of the heat supply system is the source of heat, the second-the main heat networks. These 2 levels determine the reliability of the heat supply system as a whole, so their elements are reserved, and the heat networks are ring-shaped. The next levels are distribution (quarterly) heating networks and subscriber inputs for consumers. When designing them, limited redundancy is allowed, and in some cases, the absence of it [3].

The heat consumption for hot water supply is not related to the outdoor temperature. It is determined by the mode of consumption of hot water, which depends on the way of life of the population and the mode of operation of enterprises. To ensure the required temperature of hot water for the consumer in 50-60 C, the temperature of the coolant in the supply heat pipe must be higher than this value, and the hot water preparation system is equipped with automation that ensures the maintenance of the temperature of the required level. Reliable and economical operation of the heat supply system is provided by the operation service, whose main tasks are uninterrupted supply of heat to consumers, ensuring trouble-free operation, improving its technical and economic indicators. Control of thermal and hydraulic modes is carried out with the help of automated control systems and control rooms, which are part of the operation service. The service has teams and repair shops. Emergency work is performed by the emergency recovery service [4].

Nur-Sultan is a highly developing city in terms of construction. Our main production facilities include the production of building materials, food products and mechanical engineering. The city ranks first in the production of construction hardware, concrete ready for use and construction products from concrete, and also has a major role in the construction of metal

construction of the city, in the production of Central heating boilers and radiators, lifting and transport equipment.

The main component of the engineering industry is:

1. repair and installation of machinery and equipment;
2. manufacture of other motor vehicles;
3. production of machinery and equipment not included in other categories;
4. production of electrical equipment;
5. production of computers, electronics and optical products.

The growth of business activity is promoted by the Decree of the President of the Republic of Kazakhstan dated January 27, 2009 No. 733 "On certain issues of Kazakhstan content in the procurement of goods, works and services purchased by organizations and state bodies".

As a result of the above, we observe a significant increase in the thermal and electrical loads of the stations of the city of Nur-Sultan [5]. The centralized heat supply system began to be formed in the early 60s on the basis of CHPP-1. In the 70s, industrial and residential construction led to the construction of CHPP-2 due to very intensive growth. As a result, the rapid development of the new capital, the construction of multi-storey residential buildings, public buildings and business centers on the left bank led to the need for the construction of a new heating plant and the reconstruction and expansion of CHPP-2. The need for the development of the city's heating system has also increased. The construction of CHPP-3 is envisaged for the smooth movement of morally and physically obsolete CHPP-1 installations with the provision of an increase in the heat load in the district heat supply zone. During the conversion of 405 Gcal/h and CHPP-1 and CHPP-2 to the possible level in 2010, we felt that by 2018 there would be a shortage of heat capacity in the district heating zone of 500-800 Gcal/h. This means that we have the need to build a CHPP-3 [6].

The construction of CHPP-3 will be built with the following requirements:

- Ensuring long-term, stable functioning of the heat supply system, taking into account the development of the city of Nur-Sultan;
- Effective selection of options for increasing the capacity of the CHPP in the production of heat and electricity based on modern technologies that ensure reliable and efficient operation of the plant;
- Reducing the amount of industrial waste released into the city's atmosphere, developing a system for recycling industrial waste using various resource-saving installations;
- Reduction of water resources costs;
- Uninterrupted operation of the energy source in accordance with market conditions.

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