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THE PROSPECT OF USING GAS-PISTON ENGINES IN THE NATIONAL ECONOMY.

Abstract: *The article discusses the prospects for creating a gas piston mini-CHP in Uzbekistan and its impact on the national economy. In particular, using the example of the Namangan region, various economic indicators are considered.*

Key words: *Gas piston, mini-CHP, national economy, Uzbekenergo, bora.*

Increasing the industrial potential of sectors of the economy and regions of the country, stimulating the development of entrepreneurial activity, increasing welfare and improving the quality of life of the population are impossible without ensuring the reliable functioning of the electric power industry [1]. Our life today is unthinkable without stable electricity. Due to the pace of progress, the demand for this resource is steadily growing. Since the electric power industry is the most important source of ensuring the sustainability of economic growth and the well-being of the population.

Sustainable power supply remains a topical topic for many countries around the world. A competitive strategy for the transition to the electricity market has been developed in Uzbekistan, which consists of three stages, which will be implemented in 2021-2025. By 2030 year, gross domestic product — doubled, industry-2,2 times, the population is expected to grow from 33,5 million to 40 million people. [2]. By 2030 year, the need for electricity will increase by 2 times compared to 2019 year and in this regard will reach 106,6 billion. In accordance with the concept of electricity supply of the Republic of Uzbekistan in 2020-2030, the amount of 120 billion kWh per year will be increased by 2025 billion kWh. It is planned to produce kWh of electricity:

- installed power while current 14 GWt. from 2030 in 29.3 GWt. up to;
- the share of renewable energy sources exceeds 25%.

Expert analysis of the Center for Economic Research and reforms [3].

In addition, on March 4, 2021, the resolution of president was adopted: Resolution President of the Republic of Uzbekistan On measures for the implementation of investment projects "Construction of a combined-cycle power plant with a capacity of 240 MW and a gas-piston power plant with a capacity of 230 MW in the Tashkent region" and "Construction of a gas-piston power plant with a capacity of 270 MW in the Bukhara region“ This is evidenced by the fact that the research topic is very relevant. [4]

The project Mini thermal electric centre - Application Studies of Options including gas-piston, consist on the development of several models for some cogeneration technologies, as well for trigeneration, whose purpose is the optimization of the design and the operation of a plant. This optimization is carried out though the solving of a thermo-economical model, using a software for nonlinear programming. For the realization of the project, it was defined the concept of energy systems and all that is related with it, like the components, inputs and outputs. A survey of cogeneration technologies was made, describing the basis of thermodynamics, the range of size, applications, and some others relevant characteristics. An analysis of the demand has been also included. The determination of the user requirements and the aspects involved with it, are topics particularly studied. Six different cases of demand have been defined, with different energy demand, climate conditions and geographical position. Thermodynamics of the technologies selected –gas turbine, backpressure steam turbine, micro gas turbine, heat pumps, compression and absorption chillers– was described in detail. On the other hand the economics of these technologies was presented, based on several studies done by scientists and academics specialists in this field. It was also investigated the currently prices and forecasts for fuels used by the technologies and electricity in one specified place; economical engineering concepts were applied. Combining all this, optimization models were built, known as thermo economical models. Finally, an analysis of the results of the modelling was made, and conclusions and recommendations are presented. With this project it is tried to have an useful guide for the selecting of a cogeneration technology for a specific case of demand. It is also tried to establish a comparison between the energy supply for a specific user producing electricity and heat separately, and with cogeneration technologies. Gas piston engines have long been used in the gas industry in gas production sites. It is known that gas-piston engines are used to drive electric generators in Uzbekistan, but the first materials were published only on the own energy center of the Art group soft textile, located on the Namangan region. The power center consists of four imported piston machines of 1,476 kW each. For heating, the thermal energy of the water of their cooling system is used, supplemented by two gas hot water boilers of 9 MW each. The estimated payback period of the power plant is about 3 years, which expired in May In 2027, the cost of one kilowatt-hour produced by a power plant is 10-11 kopecks [5]. This is a very good result, which can also be perceived as advertising, however, the payback period probably could it would be significantly less if the heat energy of exhaust gases was used with the help of heat recovery boilers, and domestic equipment was used. In this case, it was not necessary to purchase two imported gas boilers, and the gas consumption decreased by an amount of consumed. Thus, to create power in a very small use the advantages of the combined production of electric and thermal energy, Regions that were previously installed gas engines, leading up textile at Art group soft holding 4.5 MW Namangan city has Autonomous power plant, there are machines of 5.25 MW.

Naturally, the specialists of each individual enterprise installing gas-piston engines did not yet realize that they create an ESGGMATE. The second feature of the initial stage of creation. The main reason was that the withdrawal from the grid power supply is still a reaction to extraordinary circumstances. In Namangan and Chust every during the winter, the hurricane wind "Bora" blows and each time it ends with a break in power lines. In Uzbekistan, Uzbekenergo JSC proposed to the Art group textile center under construction to build new power transmission lines, build new distribution and transformer substations, etc. However, this has already become a standard problem for Uzbekistan, since almost the entire territory of Namangan, with the exception of very small local areas, is a zone of prohibition on connecting new consumers. And this is not only a problem of Namangan.

Reciprocating engines and their fuels are largely associated with road transport. This isn't surprising. About 70% of transport-sector greenhouse gas emissions today are from road vehicles, and these vehicles are overwhelmingly propelled by reciprocating engines. However, reciprocating engines are also widely used in other sectors, particularly off-road land transport, sea transport, and electrical power generation.Various forms of gasoline and diesel are the dominant transport fuels for several reasons. These include the scale of their primary resource, their affordability, and their high volumetric and gravimetric energy densities. However, natural gas, liquefied petroleum gas, methanol, ethanol, and electricity also play a part in transport.Natural gas and diesel also play important roles in reciprocating engine-driven electrical power generation. The global scale of reciprocating engine use can be grasped to some extent by considering road transport alone. Road travel has roughly doubled in the last 40 years in terms of both the total distance traveled per annum and the total number of vehicles, with roughly one billion vehicles on the world's roads today. Road travel is thought likely to roughly double again by 2050, with most of this growth occurring in low- to middle-income countries viagreater use of light-duty passenger vehicles Given the enormous volume of road transport occurring today, it is not surprising that reciprocating engines already contribute significantly to global emissions of greenhouse gases and other pollutants, and their adverse impact on urban air quality and mortality is featured regularly in the press. In most system-level studies, the use of more fuel-efficient vehicles and alternative fuels are the primary projected means to achieve road transport sector abatement. Modal shift and more productive vehicles are also important. Although full vehicle electrification and fuel cell vehicles are efficient vehicle options, Kalghatgi rightly points out in this volume that these technologies only constitute a very small fraction of the current global fleet, and that both face significant challenges to their rapid adoption.Therefore, more effective use of increasingly efficient and cleaner reciprocating engine-driven vehicles is the dominant means by which we will reduce vehicle emissions over the next one or two decades, at least. Similar arguments hold for other transport sectors in which reciprocating engines are used. As this volume attests, many opportunities remain to improve engine and fuel performance. These include new engine concepts and the use of more advanced engine subsystems, with fuel injection and after-treatment as two active areas of current research. Modal shift and more productive vehicle use should also be transformative. Our working, learning, and socializing are increasingly taking place online, and innovation in mass transit continues apace. Information and communication technologies have also already disrupted the transport sector, directly not only via Uber and similar, but through less obvious, yet major, innovations such as freight path optimization, real-time vehicle and network monitoring, and improved data-driven planning, to name a few. The uptake of greater vehicle autonomy is a logical part of this transition. In order to offset the higher upfront costs of the technologies required to achieve substantial autonomy, it is expected that these vehicles will first appear in commercial applications in which reduced need for or complete removal of a paid driver is the major economic benefit for the business and its customers. Such examples include the displacement of conventional taxis and public transport with ride-sharing autonomous vehicles, and the displacement of freight vehicles with their autonomous equivalents.

Like any capital-intensive asset, further economic benefits are then likely to be achieved by maximizing vehicle use, as is the case with conventional taxis, public transport, and freight today. Thus, heavy autonomous vehicle use over relatively long distances is likely to prove economically beneficial. In such cases, it is not obvious that full vehicle electrification will follow, given range and recharging/refuelling time requirements. Rather, greater vehicle hybridization may result, with advanced reciprocating engines and cleaner fuels then continuing to play an important role.

At the same time, we should not be too focused on using technology alone to achieve our goals. For example, several studies have found substantially greater public health benefits from active travel (e.g., walking, running, and cycling) displacing vehicle use, in comparison with the health benefits that arise from the increased use of lower emission vehicles for the same travel task. Such findings will hopefully lead to significant abatement of greenhouse gas emissions from transport as a co-benefit of improved public health—particularly when governments consider the reduced public health costs from active travel relative to investment in public transport, and dedicate routes for walking, running, and cycling. A broad perspective of the plethora of different options available makes it clear that we need to take a more system-level approach to the important, dual challenges of decarbonization and improved human health. Numerous technological and non-technological options can help to achieve both goals, and there are risks in ignoring potentially poor environmental or economic performance by technologies that are commonly assumed to be always beneficial or benign. Ideally, therefore, we should regulate the life-cycle emissions of greenhouse gases and other pollutants from vehicles and their fuels while integrating non-vehicle options into such analyses. Should such regulation be achieved, it is then expected to result in the continued use of reciprocating engines for several decades while engines, fuels, vehicles, cities, and our attitudes continue to evolve.

In conclusion, the construction of a mini CHP with a gas piston in the conditions of Uzbekistan is highly effective. Because the unbalanced energy system in Uzbekistan is an example of this situation.

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