

TECHNICAL SCIENCES

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RESEARCH OF THE IMPACT OF PRODUCTION AND OPERATION OF PHOTOELECTRIC PANELS ON THE ENVIRONMENT

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Annotation: Of course, solar energy does not create harmful emissions into the atmosphere for human health and has certain advantages in comparison with other types of energy. However, there are a lot of questions about the technology of creating photovoltaic panels, and especially about their disposal after the expiration date. These issues should be dealt with - this article is devoted to this problem.

Keywords: photovoltaic panels, toxic substances, explosive gases, silicon, cadmium, recycling, environment.

Unlike fossil energy sources, renewable energy is energy in a pure form. But in order to say so, it is necessary to study the environmental impact of all types of energy. In this article, we will focus on the unintended consequences from the initial production to distribution and end use of renewable solar energy sources, namely photovoltaic panels, because the main thing is to realize all possible negative consequences in order to prevent them and avoid any damage to human health or the environment. After all, sometimes in pursuit of a certain economic benefit, it is easy to lose sight of the long-term consequences.

And so: solar energy is not ideal? Let's consider this question. Like everything in life, solar energy has its pros and cons. Despite the environmental cleanliness of

the energy received, the solar cells themselves contain toxic substances, such as lead, cadmium, gallium, arsenic [1, c. 10-12]. Modern solar cells have a limited service life (30-50 years), their active use will imply the problem of disposal. Depending on the solar cell manufacturer and country of origin, the chemicals used may or may not be disposed of. There are companies that lead by example in solving this issue, and there are those that are trying to save money.

Solar radiation is used not only for space heating, the energy of the Sun is used either by converting it into electrical energy in photovoltaic cells, or into thermal (heat) in water, in the latter case, solar radiation is focused before being converted into heat. Heat is transferred to water or other fluids that circulate through pipes in district heating systems or are used to generate steam that drives generators to produce electricity. In the production of wet chemicals in photovoltaic cells for etching solar plates, toxic gases are used (their evaporation can lead to global warming), explosive gases (nitrogen trifluoride, sulfur hexafluoride), as well as corrosive liquids. Dry processes are also being developed, in which the emission of polluted wastewater is significantly less compared to the wet chemistry process. Photovoltaic solar panels containing cadmium telluride (CdTe) are highly toxic. Cadmium is a known human cardiogen and therefore extreme precautions are needed, such as life cycle management, where manufacturers assume that the product will be used from start to finish in thin film solar cells [1, c. 22-24]. Other toxic chemicals such as cadmium sulfide (CdS) and gallium arsenide (GaAs) are also used in the production of photovoltaic cells. Because these chemicals are highly toxic and persist in the environment for centuries, disposal by a solar cell can have serious consequences. Potential consequences during their disposal could be, for example, the accidental or accidental release of toxic chemicals.

In addition to chemical toxic substances, the problem of waste arises, and this problem will only increase in the future. The largest percentage of waste, about 90%, is glass. The smaller part is made up of cables and semiconductors made of valuable metals, which are wrapped on all sides with plastic. Today, most parts of solar photovoltaic panels can be disposed of with other standard electronic waste.

Countries that do not have reliable e-waste disposal facilities are at a higher risk of recycling problems. These are the main environmental issues associated with the photovoltaic industry [3, c. 122]. These issues need to be considered more carefully, because for all the benefits of using photovoltaic panels, the statement that solar photovoltaic cells are a “green” energy technology is very controversial, since a lot of energy will be spent on the production of photovoltaic panels, which is accompanied by significant emissions. into the atmosphere of toxic elements. Mass production of photovoltaic solar cells will lead to large-scale greenhouse gas emissions, which is a direct threat to the environment and human health, and in the long term. Consequently, solar radiation is a public and inexhaustible source of energy. Theoretically, solar energy is completely safe for the environment (except for the presence of toxic substances in solar cells).

The disposal of significant amounts of solar modules in a particular area leads to an increase in the risk to local flora, fauna and human health. Leakage of chemicals from dismantled modules presents the possibility of contaminating local soil and surface water. However, the issue of recycling solar panels in the world has not yet been fully resolved [3, c. 123-124]. At the moment, this issue is not yet a global problem, but it may soon become one if a policy is not thought out in terms of reusing photovoltaic panels or their disposal. Therefore, the unforeseen consequences of the production and operation of photovoltaic panels must be studied and taken into account.

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