of this kind on a small moving platform [2]. Taking into account the advantages of such alternative vehicles, the perspectives of thorium cars usage look impressive (see the comparison below).

Table 1

Thorium	**Fossil fuels:**
No pollution	Eco damage
High efficiency	Low/medium efficiency
Insignificant amount of fuel used	Great amount of fuel used

However, there is no working prototype of a thorium car now, which makes further discussion of thorium cars groundless. Further research and experiments in this field are hindered by the fact that nuclear power seems to be dangerous for the society. The reasons are obvious – the society have experienced the epic disasters of the past, such as Chernobyl and Fukushima. However, Laser Power Systems' CEO, Dr. Charles Stevens, claims that a single sheet of aluminum foil will provide passengers with enough protection from radiation when riding in the vehicle and that people may get more radiation from one of those dental X-rays than from thorium-powered car [4].

The overview given within this paper clearly demonstrates that currently there is a lack of experimental data to conclude whether the thorium-powered vehicles will become transport of future. It is also important to take into account probable environmental impact, which can be identifies only in the course of the research.

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ENVIRONMENTAL ISSUES RELATED TO "SHALE REVOLUTION"

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Shale gas is a kind of natural gas stored in the reservoirs which are located in the thick layer of sedimentary rock. The reserves of particular gas reservoirs are small; however, if taken together, they would be enormous, which necessitates implementation of special and sophisticated extraction technologies. Shale deposits are found on all continents, thus, virtually any energy-dependent country can provide a necessary source of

energy itself. Due to the "shale revolution", the USA became the largest producer of shale gas in the world, which led to the rapid fall in international prices for this kind of energy. The result of the shale revolution was the fact that the percentage of shale gas in the total domestic production of natural gas in the US in 2012 reached 40%.

In contrast to the largest conventional gas deposits, the advantage of shale gas production is due to proximity to the consumption centre. Meanwhile, the extraction of shale gas causes serious environmental problems because of broad areas and significant interference into the subsurface. Among the major environmental problems faced in developing shale gas fields, the following ones are the most widely-spread: pollution of surface water and soil, groundwater pollution, gas emissions, and seismic risks.

As drilling performance inevitably involves significant amount of various chemicals and large volume of solid and liquid waste (cuttings and spent mud), special attention should be paid to ensuring that these substances do not contaminate surface water and soil during their transport, storage and disposal. The fluids used for modern hydraulic fracturing (frac) usually consist 95-98% of water and proppants, and only a minor part consists of various chemical reagents [1]. Since the composition of fracturing fluids in each case is chemically individual and chemical composition of these substances can be dangerous at a sufficient concentration, it is required for regulating bodies and health professionals to perform testing of water and soil on a schedule basis. To reduce the environmental risks, it is essential to elaborate more environmentally friendly fluids for hydraulic fracturing. To store and clean these fluids, it is important to use closed tanks, with tank tightness and integrity being constantly tested to avoid spills of hazardous substances on the earth's surface.

Horizontal drilling and hydraulic fracturing contribute to the increase in shale gas production, but the potential impact on the environment remains negative. An acute problem is the pollution of groundwater. The fact is that in deep oil shale formation fracturing may cause micro cracks through which methane and fracturing fluid can migrate into the overlying aquifers intended for collecting drinking water. Increased content of trace gases has been found in many wells with drinking water within the largest shale gas field Marcellus. American researchers analyzed 141 wells with drinking water in the territory of the Appalachian physiographic province in north-eastern Pennsylvania.

The study of natural gas concentrations was held near the wells with shale gas. In 82% of the samples in the wells with drinking water, it was found that the average concentrations of methane six times higher than standard indicators. The studied water wells were located less than 1 km from the wells with natural gas. The content of ethane was 23 times higher than allowable value at a distance less than 1 km from the gas wells. Propane was found in 10 wells which were within 1 km. Therefore, hydraulic fracturing is dangerous because it contributes to the emergence of various forms of water pollution. The existing potential ways of contamination, i.e. horizontal transfer through the entire volume of the rock and flow through the cracks may promote the transport of pollutants from the fractured shale to aquifers. There is substantial evidence that the natural cracks can lead to vertical migration of pollutants. In accordance with the simulation results, such a migration of contaminants to the surface may require tens and thousands years. However, shale hydraulic fracturing may significantly accelerate migration of contaminants up to ten and hundreds of years. The equipment and facilities failure and the presence of fault zones may also reduce the time of pollutant transfer. When using the hydraulic fracturing, it is required to implements the monitoring system to track the movement of pollutants from gas wells.

One of the main reasons for pollution of underground sources of drinking water can also be a poor cementing of casing annulus. Currently, there is a wide range of activities, allowing engineers to determine the quality of cementing and cope with this kind of problem. Constant monitoring and testing will enable producers and regulators to prevent such catastrophes. In this way, in the course of prospecting, exploration and development of shale gas deposits, there is a significant number of environmental problems, most of which can be solved due to improving the technology of shale gas production, precisely due to strict control of drilling and gas production performance.

The most important issue is to study the impact of hydraulic fracturing on the occurrence of seismic activity and various types of landslides [2]. The shale gas prospects are very large, especially in sparsely populated areas and in the countries which express their agreement to reduce the level of environmental safety.

Currently, almost all the countries where it is possible to start commercial production of shale gas, the environmental commission has been initiated to address the environmental risks associated with shale gas production.

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WE ARE DESTROYING THE WORLD

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Hydrocarbon production is not the only way to solve many problems of humanity, but also it is ranked as one of the environmental problems. In many respects, this problem emerged as a result of the negligence of a person / company or is manifested accidentally or due to naturally factors not influenced by man. Hydrocarbon development, recovery and production is out destroying our plant ecology day in and day. This fact has been confirmed by numerous surveys, studies and investigations.

There are hydrocarbon production, transportation and application problems which have a large-scale impact on environment.

Problem 1- In the process of producing oil and gas from the earth strata directly or indirectly affects and increases the mobility of rocks. This results in seismic activity leading to more disastrous consequences in some cases. But the major consequence is the so-called formation of cavities. The solution is very simple – flooding or rock in-filling.

Problem 2- When oil passes to the surface the associated gas is burned on-the spot, i.e. in the fields. It is a well-known fact that carbon dioxide has a negative effect on the atmosphere and so the another problem connected with oil production arises. According to statistics, about 30% of all industrial emissions in the Russian Federation are related to the oil and gas sector. Overall emissions into the atmosphere from oil industry enterprises are about 12% of all harmful emissions. In this case, incomplete combustion of hydrocarbons is where insufficient O2 is present, but there is excess hydrocarbon present. As a result we have such reaction products as carbon monoxide, sulfur dioxide and nitrogen oxides. Gas