

The state and prospects for the utilization of geothermal resources in the Russian Federation

Cherkasov S.V.¹, Churikova T.G.², Bekmurzaeva L.R.³, Gordeichik B.N.⁴ and Farkhutdinov A.I.⁵

¹ *Vernadsky State Geological Museum RAS, Moscow, Russia*

² *Institute of Volcanology and Seismology FEB RAS, Petropavlovsk-Kamchatsky, Russia*

³ *Grozny State Oil Technical University named after acad. M.D. Millionshchikov, Grozny, Russia*

⁴ *Institute of Experimental Mineralogy RAS, Chernogolovka, Russia*

⁵ *Bashkir State University, Ufa, Russia*

(Received 12 August, 2015; accepted 10 October, 2015)

ABSTRACT

The article presents the assessments of Russian geothermal resources and prospects of their development. The world experiences in the geothermal energy utilization have been analyzed. Based on numerous publications present classifications of geothermal resources have been considered, as well as advantage of their usage.

Key words : *Energetic resources, Geothermal resources, Geothermal systems, Geothermal waters, Geothermal heat.*

Introduction

Russia is one of the richest countries in the world in energetic resources. Everybody knows that the heavy use of irreplaceable natural energy sources, such as coal, oil, and gas, lead to steady depletion of their resources over the world, as well as in Russia. The majority of large and superlarge deposits have been extracted to 50%, it is the opinion of world experts that our country will be short of energetic resources already since the 2030-50ss (Gnatus and Khutorskoi, 2010).

In this connection the search of alternative energetic sources is one of the most burning and pressing problem in the field of the energy sector. Suffice it to say that about two thirds of the world energy is provided by thermal stations, using nonrenewable resources – fossil hydrocarbons (coal, gas, and oil products). The heating and transport significantly depends on hydrocarbon resources. Nowadays 80% of the world power consumption is provided by coal, gas, and oil, and 5% – by atomic power engineering. So the humanity depends on nonrenewable energy sources roughly to 85% (Kochieva, 2006).

Naturally, this can — extend forever especially under rising power consumption. The utilization of alternative energy sources, including renewable ones, is recognized as an urgent problem in Russia too (Decree no. 889, 2008; Decree no. 1-p, 2009).

The geothermal heat derivative from the Earth's interiors is one of the alternative renewable and inexhaustible energy sources. The authors of this article consider the prospects of geothermal energy development using world practices.

The utilization of geothermal resources over the world

Western countries started to use geothermal resources in large scale (including mass adoption of thermal pumps) in connection with the energy crisis in the 1970-80ss. The first geothermal stations and plants demonstrated sufficient profitability and economic reasonability to expand utilization of these renewable natural resources (Unukovich *et al.*, 2012). By 2010, 78 countries directly used geothermal resources with the total power of geothermal stations up to 10.7 gigawatt (Holm *et al.*, 2010), and it is shortly expected that it can rise to 18,5 gigawatt (GW).