Republic of Armenia

Geothermal Energy Development in Armenia

Hayk Harutyunyan
Deputy Minister of energy and Natural Resources

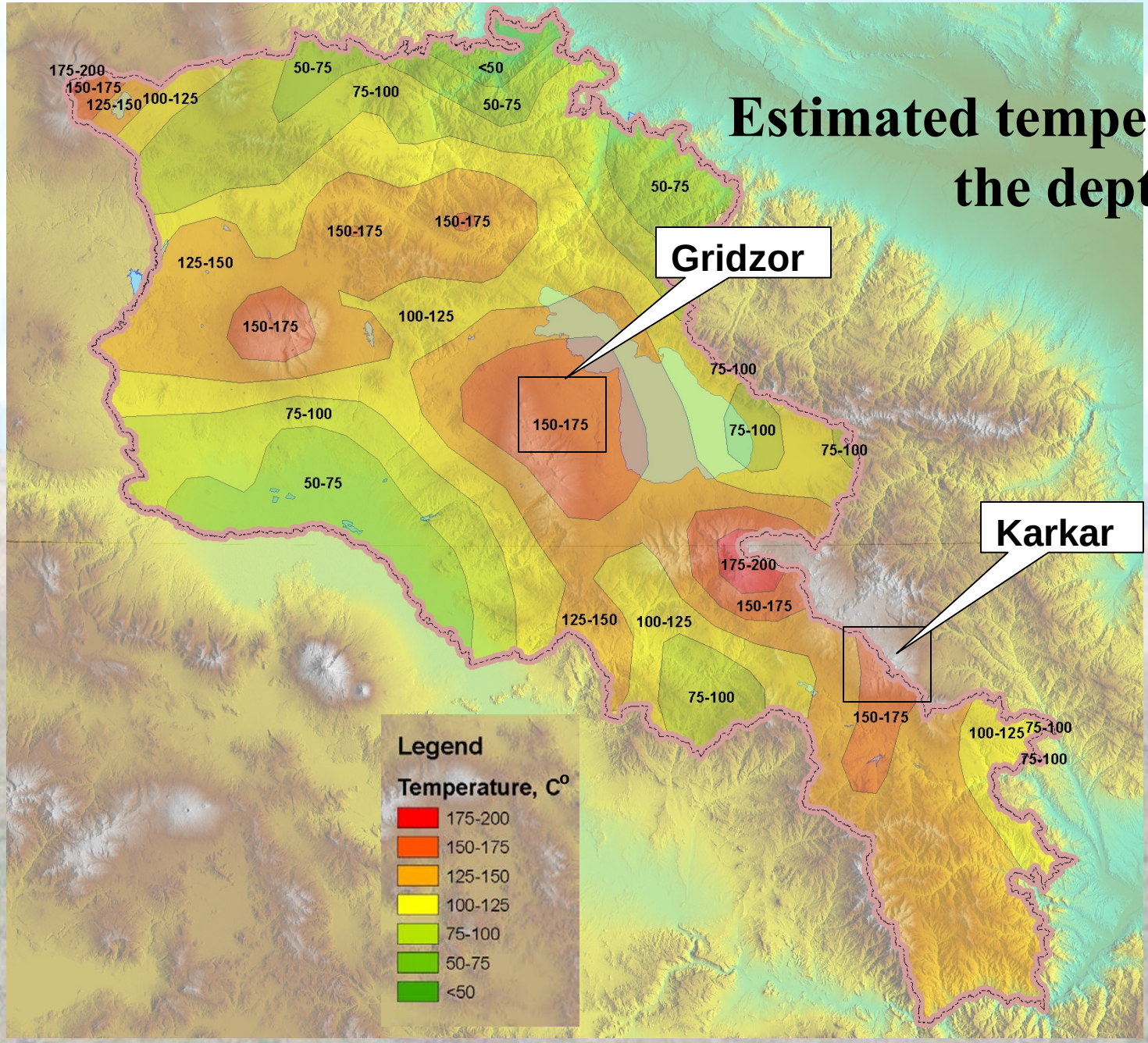
Government Prioritization of Renewable Energy

- The Law on Energy (2001)
- The Law on Energy Saving and Renewable Energy (2004)
- Energy Sector Development Strategy (2005)
- Action Plan of the Ministry of Energy and Natural Resources (2007)
- National Program on Energy Saving and Renewable Energy (2007)
- Hydropower Development Strategy (2011)
- National Energy Security Concept (2013)
- Amendment to the Law on Energy (2014) establishing mandatory off-take period of 20 years for RET
- Long term strategy for Development of Energy Sector (2015)

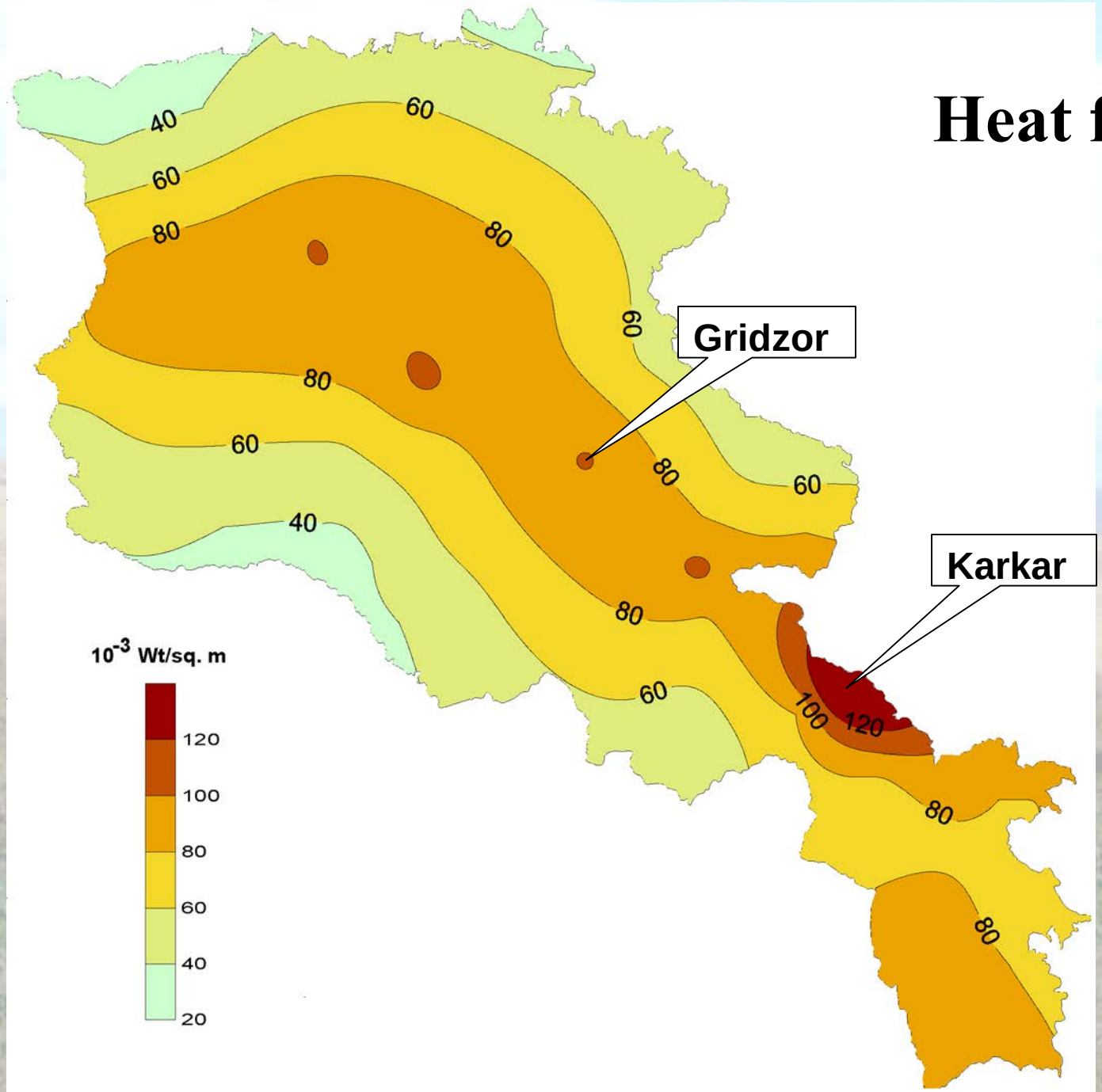
Regulatory framework for RE is being continuously improved

- Tariffs at cost-recovery levels with sound tariff setting methodology
- Feed-in tariffs for small hydro, wind, biomass and biogas
- No license for RET <150 kW capacity, net metering operation
- Off-take guarantee of 20 years for RE
- Escrow account arrangement ensuring that all generators get paid in full and without delay
- 3-year VAT payment deferral for importers of plant and equipment with total value of more than $0.5 million, no custom fee

Estimated temperatures at the depth of 2 km



Heat flow density



Geothermal developments in the Period of 2009 – 2012 with support of the WB Group

Main surveys were done in 2 selected geothermal sites - Karkar and Gridzor

The studies were implemented in two phases, and the realization if the second phase depended on the findings of the first one.

***Phase Ia* – field geological surveys and 2D magnetotelluric (MT) sounding;**

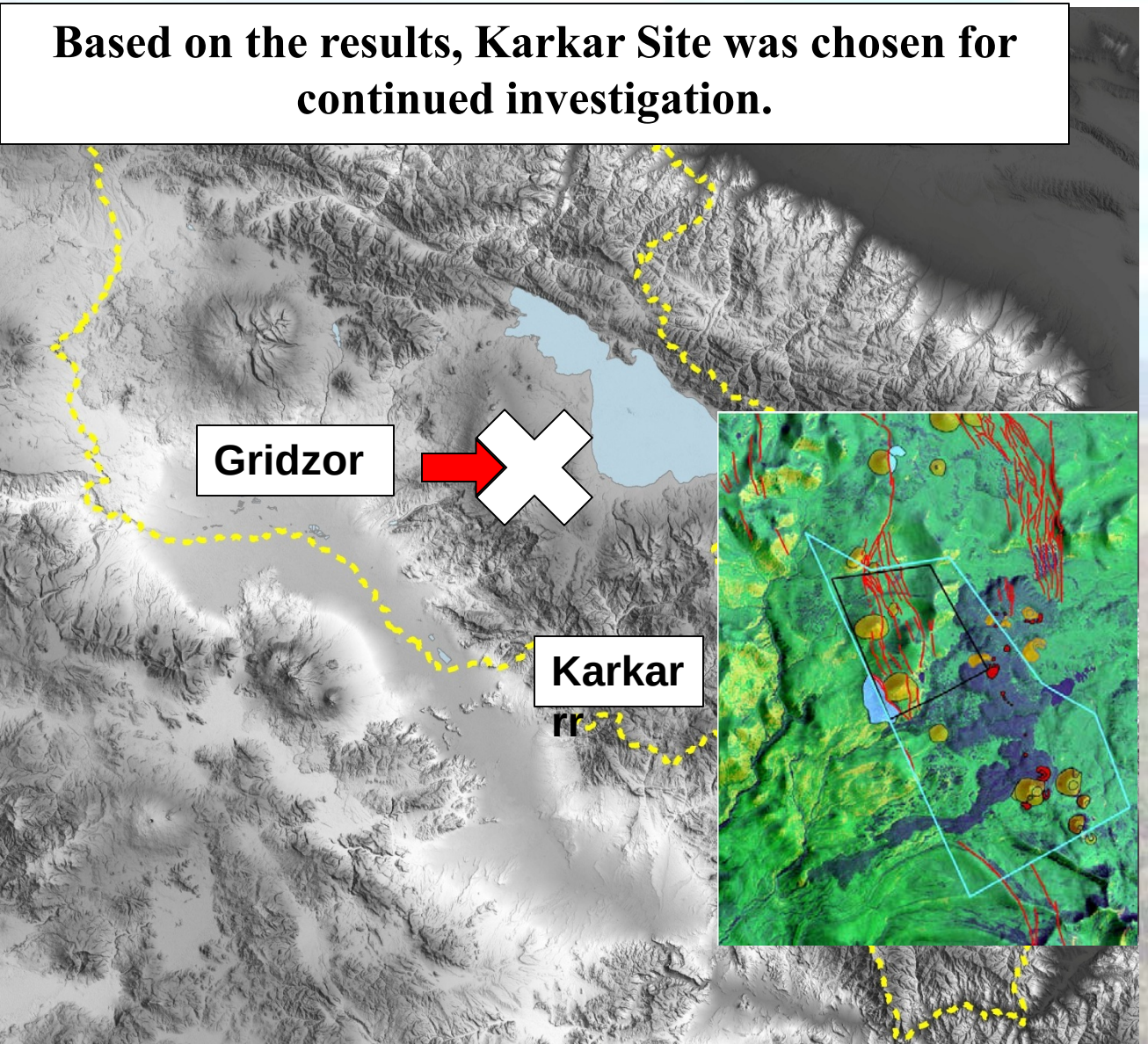
***Phase Ib* - interpretation of the data from Phase *Ia and* choice of one site for the 3D magnetotelluric (MT) sounding;**

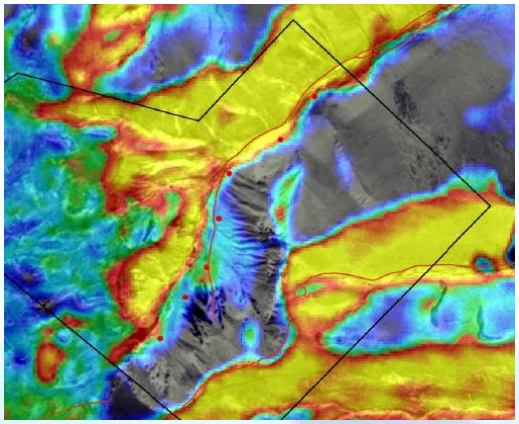
***Phase IIa* - three-dimensional (3D) magnetotelluric (MT) sounding;**

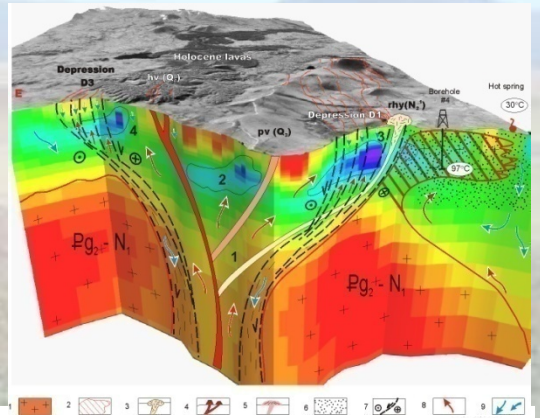
***Phase IIb* – interpretation of the data from Phase IIa to enable "drill/not drill" decision.**

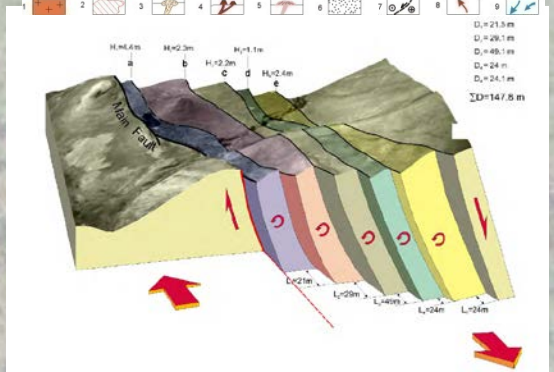
Phases Ia and Ib – field geological surveys and 2D magnetotelluric (MT) sounding

Based on the results, Karkar Site was chosen for continued investigation.

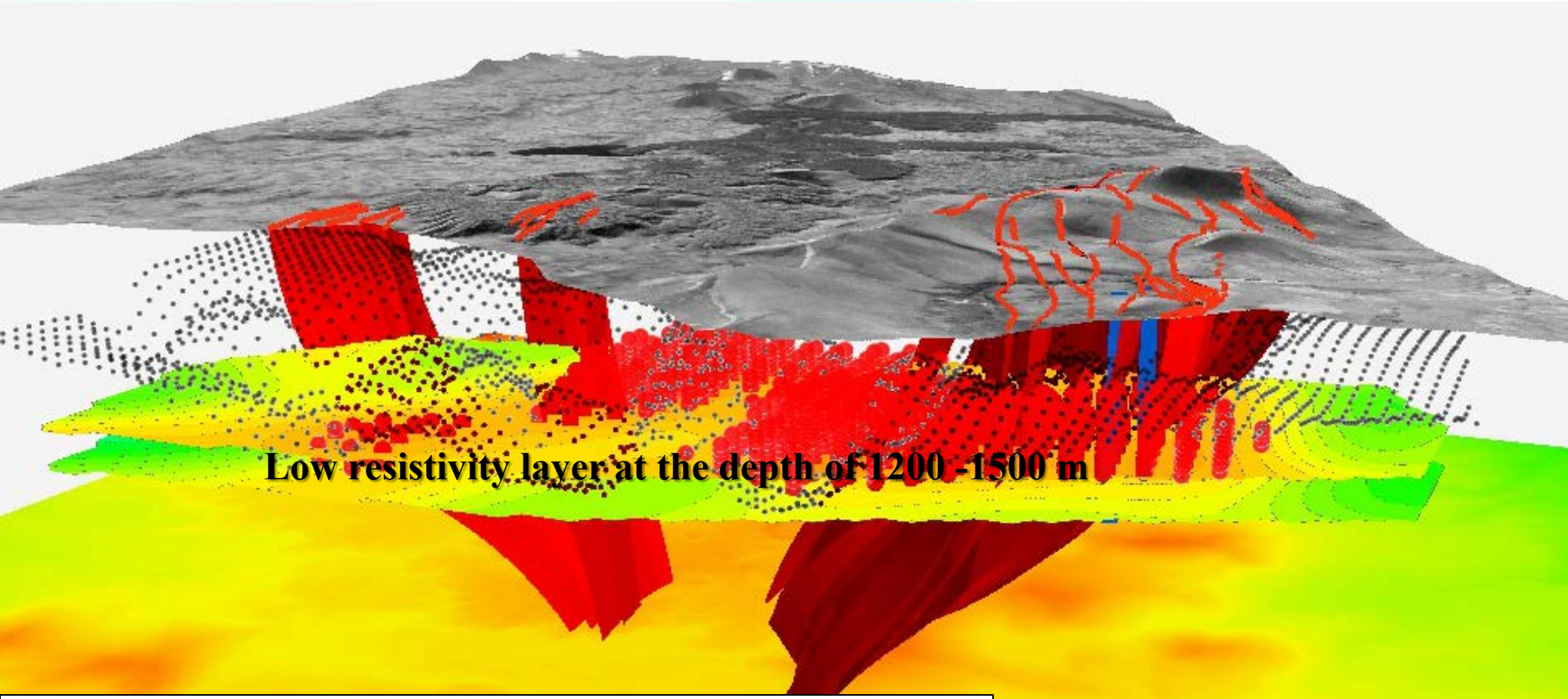






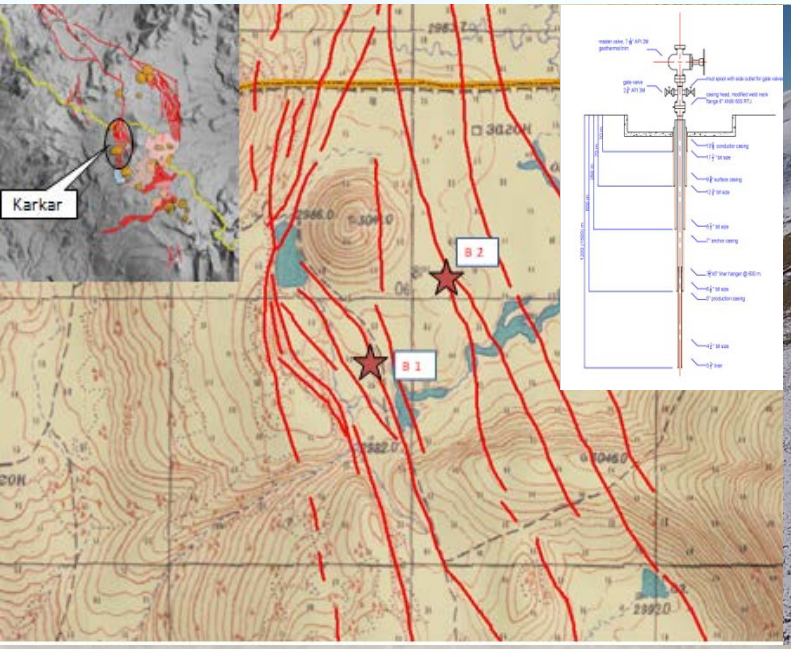


Phases IIa and IIb - three-dimensional (3D) magnetotelluric (MT) sounding and interpretation of the results



The conceptual model of the Karkar Site was developed by the results of the 3D studies relalized to the depth of 10 km. Low-resistivity layer identified at the depth of 1200 – 1500 m may correspond to a geothermal reservoir.

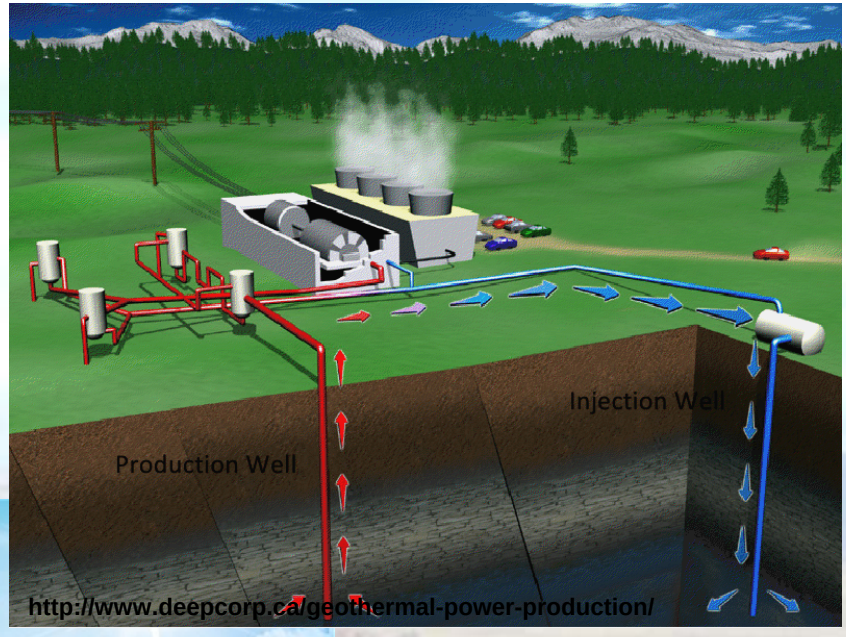
The Period of 2015-2019.
It is decided to drill two slim wells.



Well drilling locations are identified, and drilling infrastructure is created: the access road, drilling platform and water supply system are built.

SREP in Armenia

SREP - $40 mln.
Total Investments - $200 mln.



$9mln. for exploratory drilling at Karkar

GEDP – Phase I

(a) construction of a gravel road with sufficient length and width to allow for safe transportation of equipment and other materials to the Project Site;
(b) preparation of rig pads for slim-size wells;
(c) Installation of equipment and minor works at the water source.
(d) Drilling of up to two slim-size wells.
(e) Well logging and well testing activities.
(f) Technical supervision and support

GEDP – Phase II

(a) **Construction of Water Infrastructure and Rig Pad,**

(b) **Construction of infrastructure to supply water for the drilling activities and a rig pad(s) for production-size well(s)**

(c) **Drilling of production-size exploratory well**

(d) **Technical supervision and support**

(e) **Well logging, mud logging and well testing**

(f) **Feasibility study for a potential geothermal power plant**

(g) **Transaction advisory support on the design and implementation of a PPP scheme for a potential geothermal power plant.**

- Scenarios for further developments:
  1. If the results from the first or second slim well show that reservoir temperature is below 90^{o}C, the project would stop;
  2. If the results from the first slim well show that the nature of the geothermal resource is suitable to build a flash power plant, then the Government could initiate construction of flash cycle power plant after completion of this project. Thus, the Government will proceed to Phase II drilling
  3. If the results from the first or second slim well show that the nature of the geothermal fluid is not suitable to build a flash power plant , then the Government will decide whether it would like to build a binary geothermal power plant

Geothermal Exploratory Drilling Project

Geothermal Exploratory Drilling Project

Current activities

- Drilling mobilization activities
- Evaluation of proposals for well testing

Project is implemented by R2E2 Fund

www.r2e2.am


THANK YOU!