

## EXTRAORDINARY INFORMATION

Budapest, 27 April 2015

### Successful drilling of the second well around Győr

**PannErgy Plc's subsidiary, DD Energy Ltd hereby informs the actors of the capital market that the BON-PE-01 geothermal drilling has reached the targeted fault zone in the pre-determined layer formation, and total mud loss followed. The preliminary test results reflect that on the surface the thermal water found in the hit layer features 95-100 liters/second free-flowing water yield with 97-98 Celsius degree temperature identically to the PER-PE-01 well. After the completion of well deepening, the upcoming days will see the long-term testing of the well and the startup of water production in the course of which the detailed hydrodynamical properties of the well –water temperature, wellhead pressure and yields –, as well as the water-yielding capacity of the layer will be determined.**

On commission by DD Energy Ltd, it was on 7 December last year when DoverDrill Ltd launched the drilling operations for the well of Bőny. In the first phase of the drilling performed in successive stages, these works were executed without geological and technical difficulties, while in the second phase there were several unforeseen obstacles that hindered the progress of deepening. After eliminating the obstacles to the works, the geothermal drilling of Bőny reached the targeted fault zone at a depth of 2450-2470 meters, and total mud loss followed. The preliminary test results reflect that on the surface the thermal water found in the hit layer features 95-100 liters/second free-flowing water yield with 97-98 Celsius degree temperature identically to the PER-PE-01 well. After the completion of the deepening of the well, these days see the long-term testing of the well and the startup of water production in the course of which the detailed hydrodynamical properties of the well – water temperature, wellhead pressure and yields –, as well as the water-yielding capacity of the layer are to be determined. The well-drilling operations will continue in May with the third geothermal well.

*"In addition to the drilling works in Bőny, the planning of the surface facilities needed for the operation of the Geothermal System of Győr has been concluded, currently tenders for suppliers and contractors are being announced and evaluated. By the beginning of May the so-called secondary power transmission section constructed between the geothermal wells and the heat transfer points will have been completed in 75-80%, and during this process, under a 60-meter section of the highly busy Motorway M1 and a 50-meter section under Main Railway Line no. 1 (Budapest-Hegyeshalom-Rajka) the pair pipes will be conducted with the use of the pressing technology, without causing any disturbance to the traffic. Besides, along the route the pressing technology has been used to make 100-meter lengths of pipe-passing at 4 additional locations. The selection of the contractors for the primary (thermal loop) pipeline is in progress, the works will soon be completed." – declared Péter Tóth, PannErgy Plc's Chief Executive Officer.*

### Technical contents of the drilling works of the BONY-PE-01 well:

In the first phase of the drilling works, in line with the earlier plans, a string of 13 3/8" safety casing pipes was laid and sheath-cemented at a depth of 1250 meters. The second phase witnessed the continuation of vertical drilling down to 1754 meters, and thereafter



directional inclined drilling was launched all the way to 2100 meters. With the shoe position successfully created at a 2111-meter drilled depth, the incorporation and cementing of the 9 5/8" hooked casing pipe string was implemented. In continuation of the works with pipe-casing and cementing, the geologists and drilling experts evaluated the relative positions, similarities of the drilled and planned layer sequences, and on the basis of the factual data the spatial course of further drilling was determined. With the directional inclined drilling in the 8 1/2" drilling section, the well was further deepened. Owing to the appropriate geological and geophysical preparations, the Triassic dolomite layer was passed, but there was little information available in relation to its mechanical properties, and therefore the collapsible, eroding dolomite layer found in the last phase of the drilling posed new challenges on the deepening operation. The very easily eroding layer considerably slowed down the works, resulted in the jamming of the tools, but the competent Mining Inspectorate acted very helpfully to issue the permit needed for the resolution of the given technical problem in the framework of accelerated proceedings.

The presence of the eroding dolomite layer reached in the process of deepening suggested very intense geothermal operations. In addition to chemical changes, mechanical impacts also contributed to its emergence; generally, it can be found in the surroundings of geyser-like eruptions of thermal springs that are rich in carbon dioxide, and also contain other mineralizing gases.

During the works performed to release the jammed tools and lasting for 37 days on the whole, it was not just the ordinary methods that were applied, but innovative techniques were also used, and as a combined result drilling could be successfully continued. In the light of the properties of the eroding dolomite layer, the section of the well under the 9 5/8" casing pipe needed to be re-drilled. In view of the geological risks, the drilling process was continued with special parameters – decelerated drilling, reinforced mud cake –, which contributed to the prevention of collapses and jams. As a result of the resolution of the technical problems, the drilling time became longer, while the geological formations in the target area could be identified in even more details.

The fault zone within the Triassic dolomite layer was intersected again in the 8"-diameter section, where full mud loss followed. After that, the 7" hooked string of casing pipes was incorporated down to the well shoe. In this element of construction, the dolomite and eroding dolomite above were separated from the clay layers with the installation of a so-called expanding packer, under which a filtered section of casing pipes was placed through which the thermal water from the layer flows to the internal space of the well structure.

### *PannErgy Plc*

