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## **PannErgy Plc**

**QUARTERLY PRODUCTION REPORT**

**for the period of Q3 of 2019**

**15. October 2019**

**Introduction:**

PannErgy Plc publishes quarterly production reports in order to present its operations in green energy generation and utilization in Hungary. In this report, PannErgy gives a description of the conditions of its geothermal energy production systems, functioning and operating experience, as well as information in relation to the realized green heat sales.

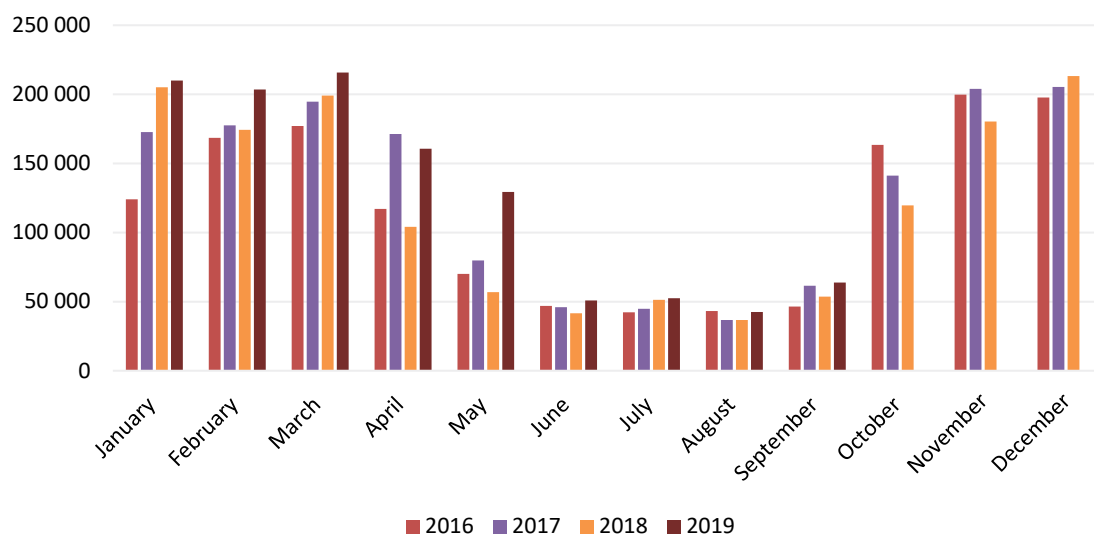


Figure 1

**Consolidated quantity of heat sold (GJ)**

The chart illustrates the aggregate amount of heat sold by the Miskolc, Győr, Szentlőrinc and Berekfürdő projects, in a monthly breakdown.

	2016	2017	2018	2019	2019 plan	2020 plan
January	124 060	172 758	205 199	209 999		
February	168 574	177 533	174 300	203 484		
March	177 177	194 634	199 090	215 693		
<b>Q1</b>	<b>469 812</b>	<b>544 925</b>	<b>578 589</b>	<b>629 176</b>	<b>627 988</b>	<b>633 308</b>
April	117 075	171 294	104 033	160 548		
May	69 990	79 700	56 758	129 300		
June	46 866	45 936	41 641	50 780		
<b>Q2</b>	<b>233 931</b>	<b>296 930</b>	<b>202 432</b>	<b>340 628</b>	<b>266 304</b>	<b>270 980</b>
July	42 193	44 865	51 247	52 406		
August	43 294	36 709	36 794	42 415		
September	46 429	61 502	53 650	63 731		
<b>Q3</b>	<b>131 916</b>	<b>143 076</b>	<b>141 691</b>	<b>158 552</b>	<b>145 550</b>	<b>150 541</b>
October	163 409	141 270	119 652			
November	199 716	204 045	180 263			
December	197 650	205 251	213 267			
<b>Q4</b>	<b>560 775</b>	<b>550 566</b>	<b>513 182</b>	<b>0</b>	<b>590 266</b>	<b>603 237</b>
<b>TOTAL</b>	<b>1 396 434</b>	<b>1 535 497</b>	<b>1 435 894</b>	<b>1 128 356</b>	<b>1 630 108</b>	<b>1 658 066</b>

Figure 2

Consolidated quantity of heat sold, in GJ, in a table.

A comparison of the 2019 Q3 heat sales figures to those of the corresponding period of 2018 shows a year-on-year improvement in the utilisation of capacities at the Győr and Miskolc Geothermal Projects.

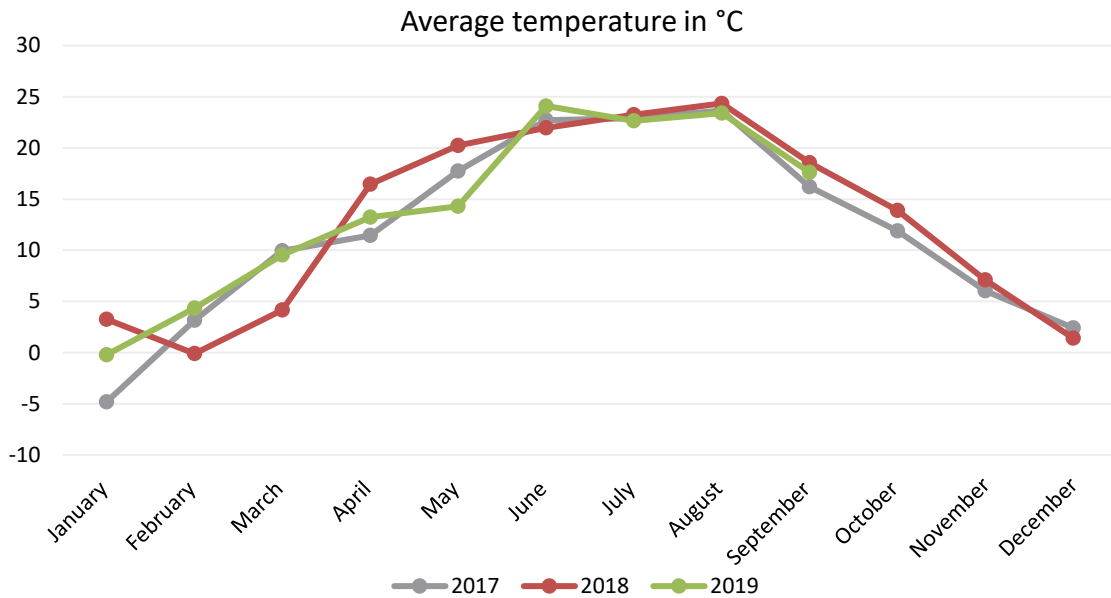


Figure 3  
Average temperatures in 2017-2019

The 2-8 °C ambient temperature range is ideal for day-to-day geothermal heat sales during the heating season, especially when the difference between the daily minimum and maximum temperatures is as small as possible. Average daily temperatures in the period under review were practically the same as in the corresponding period of 2018 and accordingly, the 2019/2020 district heating season did not begin in September this year either. The amount of heat sold in 2019 Q3 was up 12% compared to the base period.

### Miskolc Geothermal Project

(Miskolci Geotermia Zrt., Kuala Kft.)

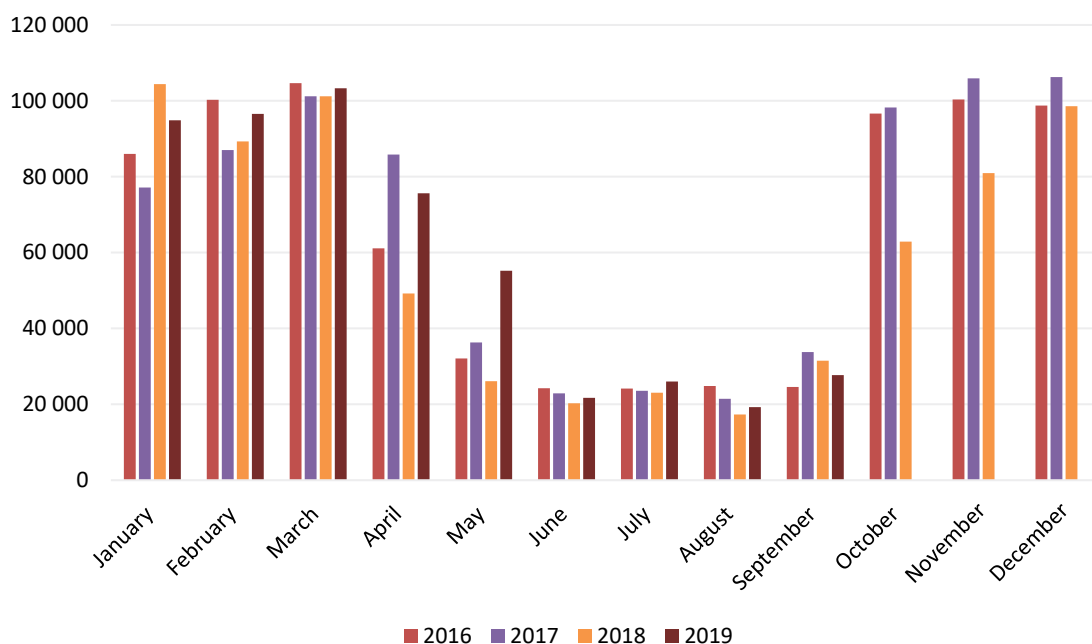


Figure 4  
The amount of heat sold at Miskolc, in GJ

The Geothermal System of Miskolc sold a total of 72,958 GJ thermal energy in 2019 Q3, similar to the value achieved in 2018 Q3. The 2019 summer maintenance programme was concluded successfully during the period under review; preparations for the 2019/2020 heating season are complete.

### Győr Geothermal Project

(DD Energy Kft., Arrabona Koncessziós Kft.)

The Geothermal System of Győr sold a total of 84,277 GJ thermal energy during 2019 Q3, up 24% year-on-year. As regards heat sold during the period, thanks to the expanding cooperation with heat-receiving partners, heat sales in September were higher this year than in the corresponding period of 2018.

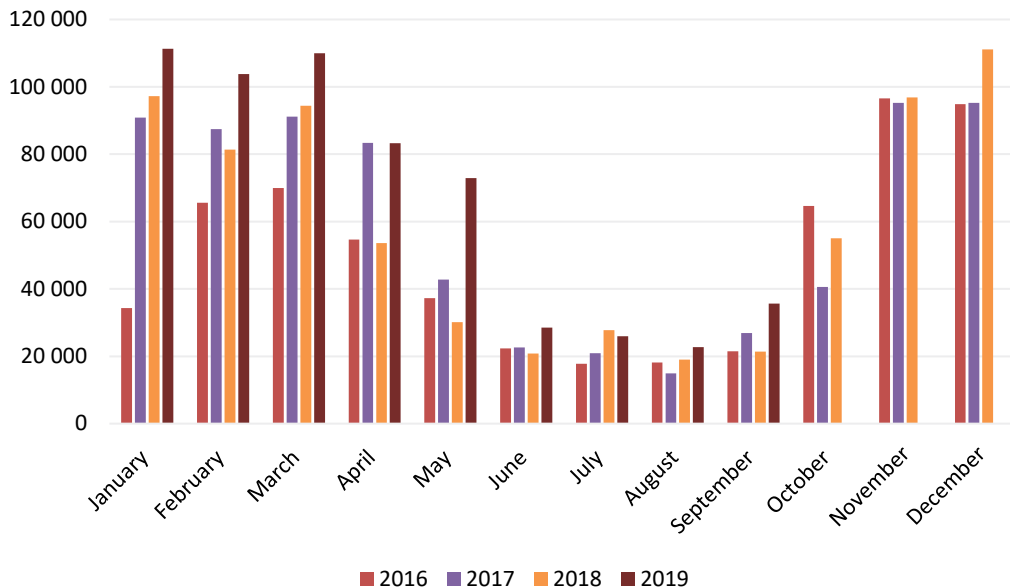


Figure 5 Amount of heat sold in Győr (GJ)

**Geothermal Heating Facility of Szentlőrinc**

(Szentlőrinci Geotermia Zrt.)

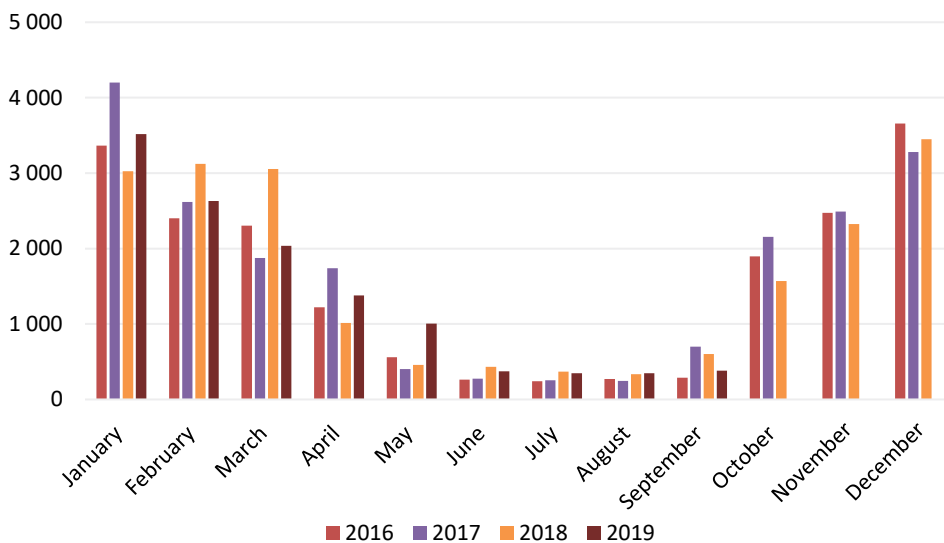


Figure 6 Amount of heat sold in Szentlőrinc (GJ)

The Geothermal Heating Facility of Szentlőrinc sold a total of 1,077 GJ thermal energy in 2019 Q3, which falls short of the value recorded in the base period. While heat sales in the summer months were largely the same as in the previous year, a difference can be observed in September compared to last year’s performance. Given the mild weather conditions – intermittent – heating did not begin until the first days of October in the period under review, whereas heating began as early as September in 2018.

**Geothermal Methane Utilization Facility of Berekfürdő**

*(Berekfürdő Energia Kft.)*

The Geothermal Methane Utilisation Facility of Berekfürdő sold a total of 311,482 kWh electricity during the period under review. The availability of gas engines was insufficient – especially in September –, which took its toll both on electricity and heat production.

Heat sold during the review period amounted to a total of 240 GJ, less than the value recorded in the corresponding period of 2018.

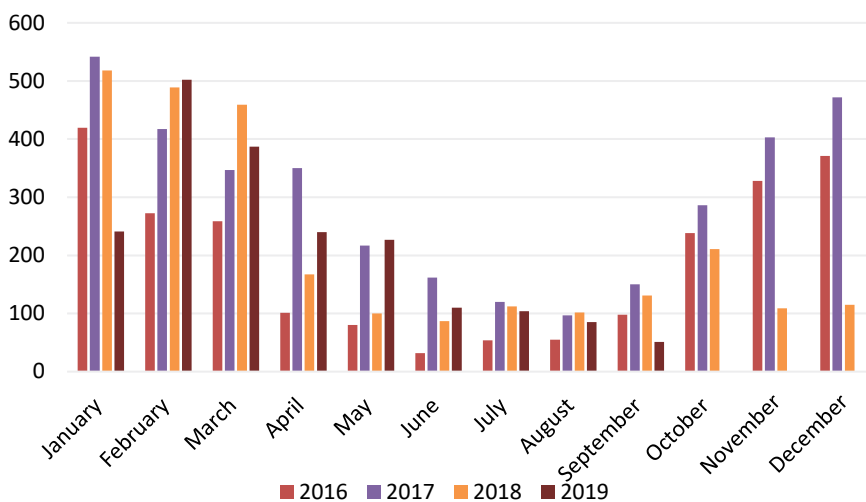


Figure 7 Amount of heat sold in Berekfürdő (GJ)

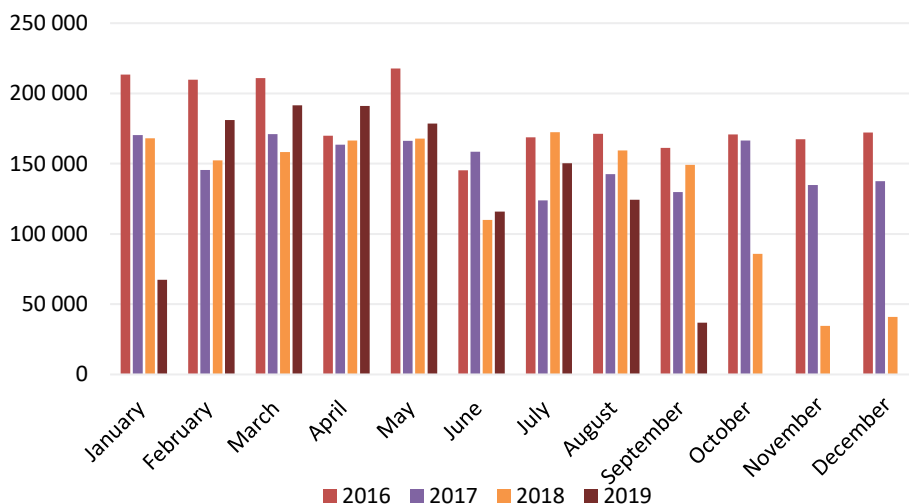


Figure 8 Electric power sold in Berekfürdő (kWh)

## Climate change

Adaptation to the negative consequences of the ongoing climate change is a national interest, given the fact that the phenomenon can now be proven by measurements in day-to-day life. In view of the existing atmospheric concentration of greenhouse gases, expected future emissions and authoritative scientific projections climate change is a persistent process. With its geothermal projects the PannErgy Group wishes to promote Hungary's climate policy by contributing to sustainability, supporting the objectives laid down in the National Energy Strategy 2030 document.

The PannErgy Group's projects contributed to the efforts made to preserve a more livable environment by the CO<sub>2</sub> emission cuts shown in Figure 9. The reduction amounted to 9 197 tons, while the total aggregate amount of greenhouse gas emission saved by the PannErgy Group so far amounts to 416 311 tons.

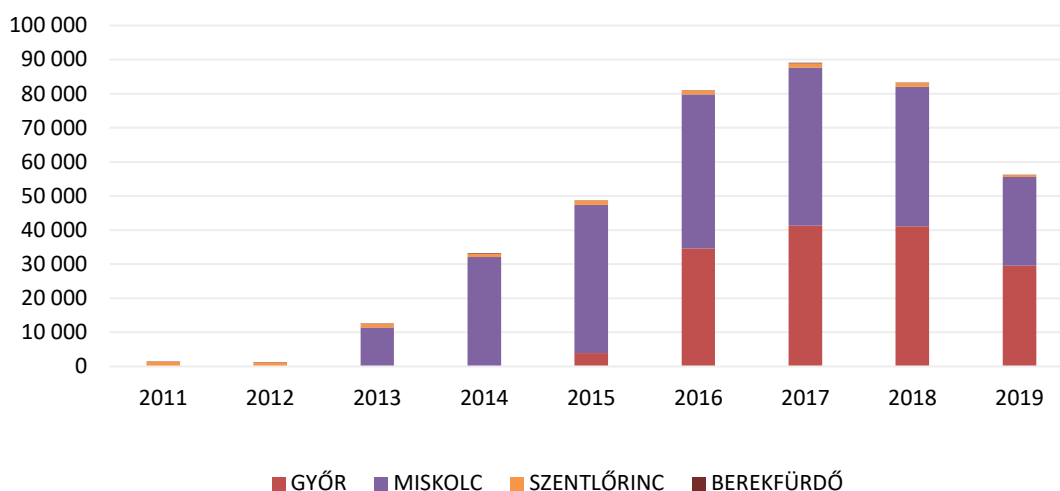


Figure 9 The amount of greenhouse CO<sub>2</sub> not released into atmosphere thanks to the PannErgy Group's projects

One of the evident effects of climate change in Hungary appears in the form of frequent hectic and extreme changes in weather conditions, including ambient temperatures, and a rise of the average temperature of the winter months from the historically cold, stable sub-zero range to markedly over the freezing point. These changes are not expected to have an adverse impact on the output of geothermal heat generation; indeed, perspectives of input into district heating systems are favorable as an average over multiple years.

The reason for this is – as is noted in this report – the fact that daily geothermal heat sales are ideal in the 2-8 C temperature range during the heating season. At the same time, the potential decrease in the demand for heat during the transitional seasons may be compensated, indeed, overcompensated by the growth in the potential of the increasingly mild winter months.

The demand for energy in the large district heating systems supplied by the PannErgy Group is far greater than the amount of geothermal energy that can be fed into those systems. Accordingly, any change in demand stemming from the climate change for heat in the district

heating systems have had, and are not expected by the company to have in the future as a trend, any perceptible effect on the PannErgy Group.

PannErgy aims to utilize its substantial uncommitted available thermal capacities – in addition to the capacities being utilized now – which is expected to further reduce sensitiveness to ambient temperature changes. The most important possible areas for utilizing the available uncommitted thermal capacities include:

- Implementation of energy efficiency and optimizing projects with existing customers;
- Cold energy projects – for the utilization of the so-called “summer” heat;
- Connection of new customers indirectly through district heating systems or directly to the geothermal systems on the primary or the secondary (return) sides.

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