

## BioGas Synergy

### Challenge Introduction

Imagine the opportunity to contribute to environmental protection while participating in an innovative project in the field of renewable energy. At the wastewater treatment plant in Velké Popovice, biogas is produced during the wastewater treatment process from brewery operations. This biogas is utilized to heat the wastewater, which is essential for nutrient breakdown and further biogas production. In winter, all biogas is consumed due to the low temperature of incoming water; however, in summer, there is an excess of biogas that remains underutilized.

This excess, amounting to approximately 100,000 m<sup>3</sup> (equivalent to 3 TJ), presents a significant opportunity for innovative solutions. The electrical consumption of the treatment plant is covered by its own photovoltaic power plant on sunny days, indicating that the surplus biogas could be employed in alternative ways.

Your task will be to propose economic and ecological uses for this excess biogas. You can explore various possibilities such as electricity generation, heating, or even biofuel production. Your proposals should be not only technically feasible but also economically advantageous and environmentally friendly.

Accept this challenge and become part of a project that can have a real impact on sustainability and energy efficiency. Your creativity and innovative thinking can unveil new and effective methods to utilize renewable energy sources.

### Who is behind the initiative:

Plzeňský Prazdroj is a renowned international company and one of the most admired businesses in the Czech Republic. While many associate Pilsner Urquell with Czech beer, they often overlook our brand Kozel, which is the best-selling Czech beer globally and has its headquarters in Velké Popovice. Another brewery operates in Nošovice, producing Radegast and non-alcoholic Birell. The company traces its origins back to 1842 when the Pilsen type of beer was invented. Today, it stands as a stable part of Czech culture and heritage.

Plzeňský Prazdroj is part of Asahi Group Holdings, a Tokyo-listed global company involved in beer, spirits, soft drinks, and food production. With a long history in Europe, we operate 19 production facilities across eight countries. Our global beer brands include iconic premium beers such as Pilsner Urquell, Kozel, Peroni Nastro Azzurro, Asahi Super Dry, and Grolsch.



### Prazdroj Contacts

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### What is the Challenge and Its Goals?

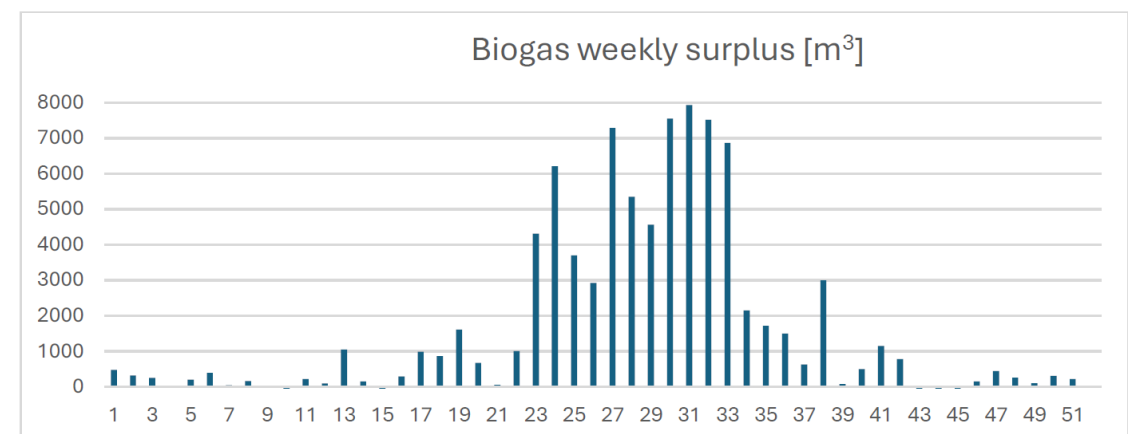
The challenge focuses on proposing innovative and sustainable uses for the excess biogas produced at the Velké Popovice wastewater treatment plant during the summer months.

The specific goals of this initiative include:

1. Utilizing Excess Biogas: To find effective ways to utilize the approximately 100,000 m<sup>3</sup> of excess biogas generated during the warmer months, which is currently underutilized.
2. Exploring Diverse Applications: To investigate various applications for the excess biogas, such as electricity generation, heating, or biofuel production, ensuring that these solutions are technically feasible.
3. Economic and Ecological Benefits: To develop proposals that are not only economically advantageous but also environmentally friendly, contributing to overall sustainability efforts.
4. Enhancing Energy Efficiency: To improve energy efficiency at the wastewater treatment plant by integrating biogas utilization with existing renewable energy sources, such as the photovoltaic power plant.

### Interested student teams are asked to present the following key outcomes:

Here is an example of an unsuccessful solution, with a simple payback of 13 years, which is too long. A variant of a traditional cogeneration unit: from the attached graph, the aforementioned surplus is mainly in weeks 23–33, when it ranges between 4,000–8,000 m<sup>3</sup>. The TEDOM Cento 100 unit is suitable for this amount, which has a thermal input of 290 kW, roughly corresponding to 6,000 m<sup>3</sup>/week. The electrical output is 106 kW. In this period, the production of 196 MWh of electrical energy can be considered, with the purchase price of electricity at 4.7 CZK/kWh and the sale price at 2 CZK/kWh. Given that the WWTP consumption is covered by PV panels during the day (8 hours), it will be necessary to sell energy to the grid. The annual savings from electricity production are therefore 750 thousand CZK. Investment costs are 5.8 million CZK, and service costs are estimated at 300 thousand CZK per year. Due to the low utilization of technology throughout the year, the simple payback is approximately 13 years.



More information will be provided at the Collider.