The TEPLATOR is an innovative concept for future district heat production. The TEPLATOR facility will use already spent fuel from commercial nuclear power plants. Consequently, this concept will produce heat without any emissions and with minimal fuel costs. The first TEPLATOR DEMO design with output power 50 MW of thermal energy will use 55 MW (VVER) spent fuel assemblies. This fuel loading will be operated for two years. The amount of produced heat for one heating season (9 months) will be sufficient for residential heating of a large city with 100,000 citizens (estimated using Czech Republic district heating systems data).

Total heat energy consumption in the European Union provided by the Eurostat data is 2179 PJ (for 2017). Population of district heating varies across Europe. Fig. 3 shows the share of district heating in the total heating and cooling energy demand in EU countries. Primary fuels used for heat generation in Europe (2017) shows Fig. 1. Preferred TEPLATOR application is in countries with widely used district heating systems, where the old fossil fuel-based technologies need to be replaced and the heat distribution can be provided by existing systems.

The preliminary economics study for the TEPLATOR construction and operation has been carried out. The calculated investments costs for the first TEPLATOR DEMO 50 MWe facility is 30 M EUR. Then the final price of produced heat is 4 EUR/GJ. Overview of district heating share in the total heat demand shows the preliminary potential of TEPLATOR application in many European countries. However, a number of further factors have to be considered. The most promising countries for TEPLATOR application (see Tab. 1) should have the higher total heat demand, that is based mainly on fossil fuels, and also possess the reserves of PWR spent fuel assemblies. As the final consumer price of district heating in EU countries is above 10 EUR/GJ, the heat produced by TEPLATOR for 4 EUR/GJ is fully competitive for all EU countries. Comparison of the calculated price for TEPLATOR with the obtained data for the conventional heat plans shows evident financial advantage of TEPLATOR. The final calculated price of the heat energy 4 EUR/GJ is lower than standard costs of the fuel and emissions allowances 6 EUR/GJ for the coal-based heat plants and likewise for other fuels plants with significantly higher fuel costs.

TEPLATOR is a perspective way of future district heating with negligible costs for fuel. Great potential for the TEPLATOR application has been identified in a number of EU countries with high heat energy demand based on fossil fuels. The consumer prices of heat in the European Union in 2019 range between 10 EUR and 26 EUR per GJ. The share of primary fuel in the total heat costs is 30% for the coal-based generation and for other fuels, it is significantly higher. This value includes fees for the carbon emissions allowances, which are becoming more expensive every year. Comparison with the price of the heat produced by TEPLATOR for 4 EUR/GJ clearly shows economic feasibility of the concept. Application of the TEPLATOR facility as replacement of the old conventional fossil fuels-based heat plants will also save significant amount of polluting emissions in according to EU climate policy.

**REFERENCES**