

## Kladovo District Heating Plant Prosumer Project

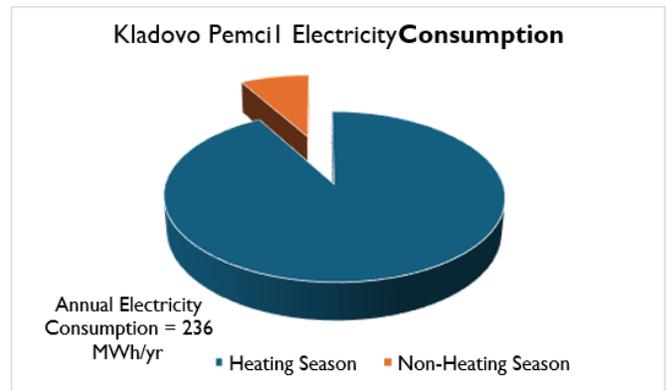
The concept of a prosumer was introduced into the Serbian legislation in 2021, with the adoption of the Law on the Use of Renewable Energy Sources. The Law defines the prosumer as the ultimate user who has connected its own facility to produce electricity from renewable energy sources to the internal installations, whereby the electricity produced is used to supply its own consumption, and the excess electricity produced is delivered to the network. The number of prosumers Serbia has been steadily increasing each year. According to data from Elektro distribucija Srbije, there are currently 3,443 registered prosumers, with households making up the majority, followed by commercial businesses. USAID's Better Energy Project, supported by E3 International's full technical expertise, identified district heating companies as an excellent prosumer opportunity. This was demonstrated through a pilot project at Kladovo district heating company, where an installed 50 kW system will have a 6.3-year simple payback based on current pricing available to prosumers.

To join the European Union, Serbia must align its energy plans with EU goals to cut carbon emissions by 2050. Since district heating companies emit a lot of greenhouse gases, using the prosumer model in these companies across Serbia will significantly reduce the country's carbon emissions.

Kladovo is often called the "green municipality" because of its natural resources. One-third of Serbia's largest national park, Djerdap, is in Kladovo. Another reason for this label is the Djerdap hydropower plant, which has been producing over 20 percent of Serbia's electricity for nearly 50 years.

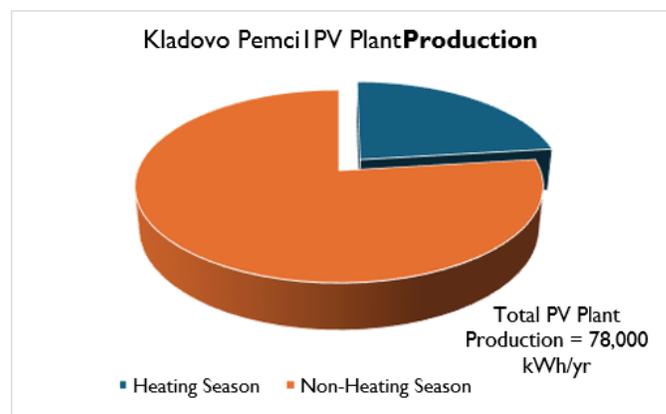
### Kladovo District Heating

The Pemci1 heating plant in Kladovo is the first heating plant in Serbia to use both biomass and solar energy. The annual electricity consumption of the plant is estimated at 236 MWh/yr, with 92% of this consumption during the heating season to operate system pumps, fans and controls. This in fact is the perfect scenario for a prosumer operation since the summer months will produce higher PV output of which most can be sold to the grid during periods of high demand.



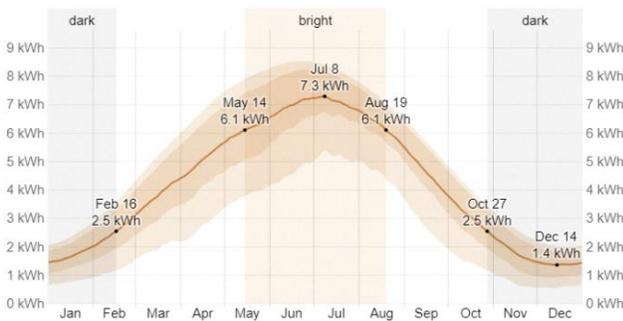
### Kladovo PV System

The PV system installed on the roof of Pemci1 is a 50-kW system, which will produce about 78,000 kWh/yr.

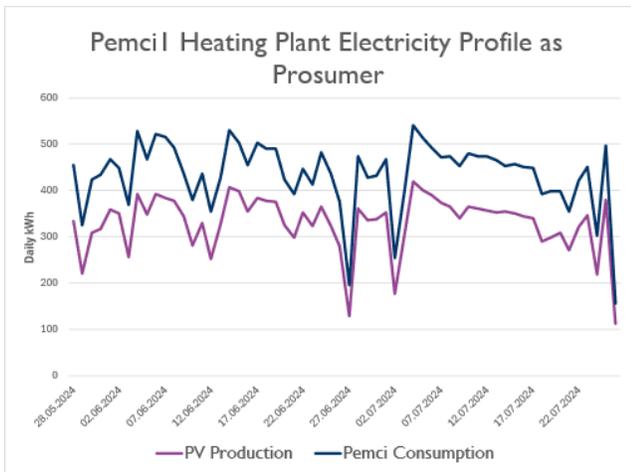


77% of the PV system output occurs during the non-heating season from April 16 to October 14, when solar insolation is highest. This offers an attractive opportunity for Kladovo heating plant to earn revenue by selling excess power from the PV system to the grid during summer periods of high grid stress from air conditioning loads. The PV system was commissioned on October 21, 2023, and Kladovo Pemci1 received its prosumer status on May 28, 2024. PV system production data and district heating plant consumption data have been recorded since plant commissioning and are presented below since prosumer status was obtained.

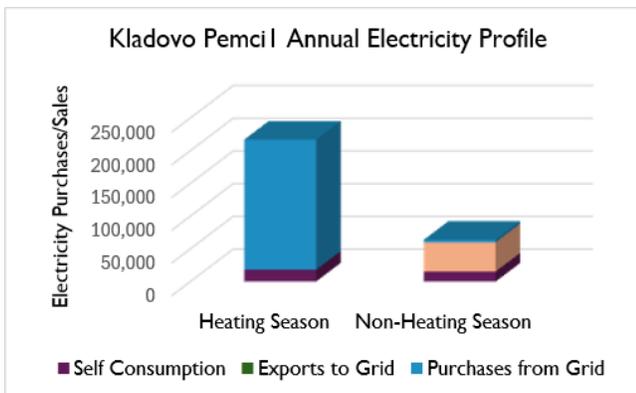
Average Daily Incident Solar Energy in Kladovo



Pemci I Heating Plant Electricity Profile as Prosumer



Kladovo Pemci I Annual Electricity Profile



## Project Impact

Given Pemci1's electricity consumption and production profile, most of the electricity during heating season is purchased from the grid. However, during the non-heating season, Pemci1's low electricity demand allows for sales of most of the renewable energy generation to the grid. Annual savings at Kladovo heating plant resulting from establishing the Pemci I Boiler House as a Prosumer with a 50-kW solar PV plant is estimated at EUR 6,600/yr – annual costs for electricity are reduced from EUR 20,600 to EUR 14,000 – a cost savings of 32%. At a cost of RSD 4,861,000 (EUR 41,620) Kladovo district heating company can expect a 6.3-year simple payback on its conversion to prosumer status.

	VALUE	TOTAL PV PRODUCTION (kWh)	TOTAL PEMCI I CONSUMPTION (kWh)
NUMBER HEATING SEASON DAYS	183	18,015.36	216,902.97
NUMBER NON-HEATING SEASON DAYS	182	60,048.63	19,115.76
ELECTRICITY PRICE FOR GRID PURCHASE (EUR/kWh)	€ 0.087		
ELECTRICITY PRICE FOR PROSUMER SALES (EUR/kWh)	€ 0.083		
PEMCI BASELINE (100% GRID PURCHASES) (EUR/YR)	€ 20,626		
PEMCI PROSUMER OPERATION (EUR/YR)	€ 13,999		
ANNUAL SAVINGS	€ 6,626		
SYSTEM COSTS (EUR)	€ 41,617		
SIMPLE PAYBACK (YRS)	6.28		

## Disclaimer

This activity was largely implemented by E3 International under its engagement on the USAID Serbia **BETTER ENERGY PROJECT** in cooperation with Chemonics International.