ADVANTAGES OF HEATING AND HOUSING FACILITIES VRF-HEAT PUMPS SYSTEM (SMMS-e)

PREDNOSTI GREJANJA JAVNIH I STAMBENIH OBJEKATA VRF-SISTEMOM TOPLOTNIH PUMPI (SMMS-e)

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Introduction

The existing office building was reconstructed in a building with a new purpose and a new investor. There is no adequate facilities for possible heat substation (TPS) is a relatively greater distance from the chambers for possible connection to the district heating system (SDG). Therefore, they considered other possibilities for heating the hotel.

Especially in urban areas decreased range of possible energy sources. In densely populated urban area of real potential sources of energy for heating the building are (if any) SDG (district heating systems), and TP (heat pump-SMMS). Other possible sources of energy for heating in this paper are not analyzed.

We want a broader consideration of the results was performed by the Hotel and analysis for a newly designed residential and commercial building 1620 (m2).

The paper compared the costs of connection, construction systems for heating, ventilation, air conditioning and heating costs at the end of the operation.

After the economic analysis are given and other advantages and disadvantages of the analyzed system.

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Brief tehnical deskription variants

Variant with connection to the system for distribution of thermal energy (SDG)

1. Hotel

Connection point to the distribution network is about 30-50 m away from the TPS, which would be allocated to a new separate room. Thermal power station is 250 kW .with indirect plate heat .Eurohit ".

Because of the need for cooling during the summer, provided the local wall air conditioners (for each room at a time).

For ventilation, reception halls and lobbies are provided recuperators air with electric reheating the air in the winter.

2. Building

Connection point to the distribution network is about 30m away from the TPS, which should be in the basement. Thermal power station is of 180kW with indirect plate heat "Eurohit

Because of the need for cooling during the summer, provided the local wall air conditioners (for each apartment one).

Variant with heat pumps

Hotel

• Heating and cooling the entire building by means of e-SMMS system "Toshiba" with VRF technology and 100 (%) inverters. Super Modular Multi System (SMMS-e) to heat the outer temperature -25 °C. The system heat pump is designed for outdoor design temperature of -12.1 °C, for winter conditions and 32 °C for summer weather, and consists of three modular heat pumps "Toshiba", with labels T1, T2 and T3 located on the flat roof.

• Indoor units "Toshiba" are thin channel units provided for rooms and apartments and a four-cluster of halls and rooms, set in the ceilings of the rooms.

Residential building

• For ventilation, reception, conference halls and hotels are built rekuperatori "Toshiba" with reheating and dohlađivanjem air (DX heat exchanger connected to the heat pump).
• Heating and cooling the entire building by means of e-SMMS system "Toshiba" with VRF technology and 100 [%] inverters. SMMS-e allows the heat to outdoor temperature -25 °C. The system heat pump is designed for outdoor design temperature of -12.1 °C / + 32 °C consists of two modular heat pumps "Toshiba", with marks T1 and T2 placed on the board above the garage.

• Indoor units are cantilever (bi-flow), "Toshiba"

Economic analysis

Connection costs and the value of investments are based on data obtained from:

1. Project to perform termotehniučkih installation (Bill of Quantities equipment and works), offer a supplier of equipment and works for both variants.

2. Decisions on costs of connections to the district heating system of the Public Utility Company "Belgrade Power Plants", published on 25.07.2014 in the Official Gazette of the City of Belgrade No.64.

3. Price List costs of connecting to the system for distribution of electricity "EPS distribution" of June 2016.

Costs for energy consumption

• The cost of energy consumption for heating are made on the basis of the documentation listed in the list Reference:

[2] Decision on Amending the Decision on pricing of heat energy, Official Gazette of Belgrade No.64 from 25.07.2014.

• For the "Hotel", the consumer categories "Other consumers," according to installed capacity
• Tsp = -12.1 °C .
• For the "Residential" category of consumers is a "living area", according to surface for Tsp = -12.1 °C .

[5] Decision on determining the price of electricity for public supply, "EPS", LLC Beograd from 08.07.2013

• For the "Hotel" category of consumers is "3. At low voltage ".
• For the "Residential" category of consumers is "3. At low voltage ".

Economic analysis shows

Total costs for construction and connection of the facility to the remote system
For Hotel: 24229271.0 dinars
For "Residential buildings": 11350979.0 dinars.

Total costs for construction and connection of the heat pump:
For Hotel: 16329381.0 dinars
For "Residential buildings": 9817990.0 RSD

The price of heating facility connected to the district heating:
For Hotel: 191 649 dinars / month
For "Residential buildings": 127981 pounds / month.

The price of heating facility connected to the heat pump:
For Hotel: 119419 RSD / month
For "Residential buildings": 90490 dinars / month

SUMMARY

Economic analysis shows that the costs of connection to the SDG:

- For the hotel for 48 [%] higher than the costs of connecting to the e-SMMS,
- For residential building by 11.6 [%] higher than the costs of connecting to the SMMS.

The price of heating to consumers is greater for objects connected to SDG:

- For a hotel of 60 [%] higher than the price of heating for buildings priključenbje the SMMS-e,
- For Housing 41 [%] higher than the price of heating for buildings priključenbje the SMMS-e.

Other advantages of heating buildings with heat pump

•**Profit for the community**: a high coefficient of energy efficiency, lower power consumption, reducing CO2 emissions.

• **Profit for inv**estors: jedininstven system for heating and cooling, domestic hot water and ventilation, low price and quick installation.

• **Profit Planners**: modern technology with heat pumps, maximum efficiency heating mode, a high degree of design flexibility devices and pipe networks, compact external units that require minimal space, a large selection of the type and capacity of indoor units, the easier integration into modern architectural solutions.

• **Profit for customers**: better comfort, the system whole year (in winter warms, cools years), it is