Case study : RIO VENA (Spain)

Name of the project:	RIO VENA
Adress of the project:	Burgos, E-09006 Burgos (Spain)
Name and type of the owner:	VEOLIA, utility company
Owner contact person:	Oscar Hidalgo, Ingeniero de Proyectos. oscar.hidalgo@dalkia.es

Context of the study

Veolia Environment (Spain) is an energy services company engaged in the maintenance management, conservation and adequacy of buildings, facilities and complexes of different nature: Industrial production sites, public entities, residential areas, offices, hospitals, etc. in order to improve comfort, performance and security at the lowest cost. Veolia who have presence in more than 48 countries accounts with over 2,000 employees and a turnover of 250 M € in Spain

The objective of Veolia in Spain is to provide innovative solutions for sustainable development of cities and enterprises, through the operation and maintenance of district heating and cooling networks, and other energy services in buildings and industry. Veolia owns in Europe over 800 local and district heating and cooling systems, and about 111,600 energy facilities worldwide.

Burgos, situated in a homonymous province of Spain, with 177,776 inhabitants, is the second most populous city of the Autonomous Community of Castilla y Leon (Spain). Rio Vena in the center of the city is a residential area that consists of 23 buildings and 704 dwellings in total. The district heating network supplies space heating and domestic hot water to the entire residential area by natural gas boilers as well as a cogeneration equipment providing electricity to the installation. This paper analyzes the combination Natural Gas - Solar energy, alternative interest to Veolia, both technically and economically.

This project would be an important example of good practice for other potential DH systems in Spain.

Support

In the past there were subsidies for the investments on renewable energy sources and energy efficiency actions, but recently all the supports that were available in the past from the National Government have been limited or cut off. The investments on solar thermal energy do not receive any subsidies at present. In some regions local authorities support this kind of actions at local level, but it is not the case of the region involved.

SDH plant

SDH system concept

.- Last four years registration has been taken into account for estimating total annual demands:

.-TOTAL: 5.099 MWh
- a) Space Heating: 4.110 MWh.
- b) Domestinc Hot Water: 988 MWh.

.- Centralized production of Natural Gas heat boilers:
- a) Two boilers (Calinter) of 4.500 kW each.
- b) Cogeneration System (Altare) with 342 thermal kW and 250 electric kW capacity.

.- Each building has its own substation (23 in total). Substations consist in a heat exchanger in order to supply space heating and 3.000 L buffer storage tanks are used for domestic hot water.

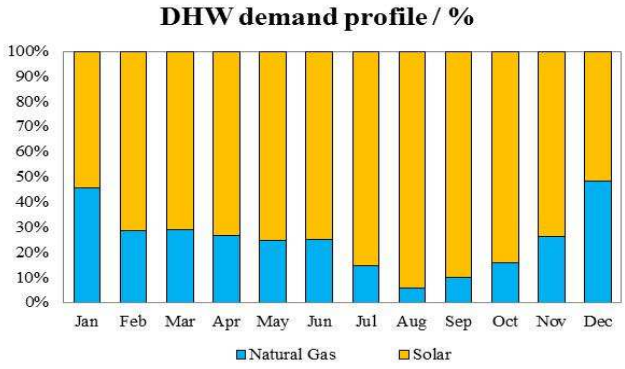
SDH technical data

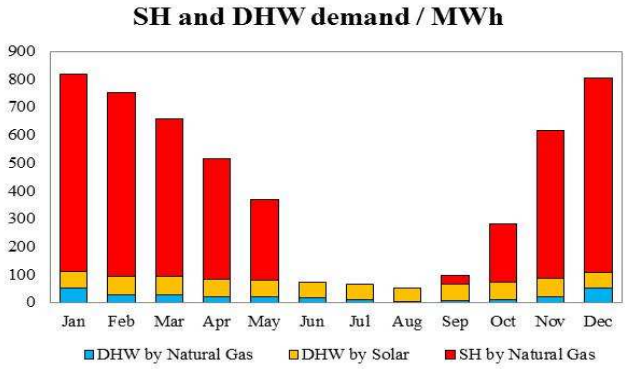
Different types of buildings has been identified for estimating most suitable solar installation from an economic-viability point of view. Table below resums each building and its solar installation and obtained solar fraction from studies developed by TECNALIA with selected configuration.

Buiding	Selected Type	Collectors area m2	Buffer Storage liters
	Pedro Maldonado Square Nº 3		
#3	1	75	2.000
#4	3	50	1.500
#5	2	75	2.000
#6	2	75	2.000
#7	3	50	1.500
#8	1	75	2.000
	Antonio Jose Street Nº 1		
#1	1	75	2.000
#2	2	75	2.000
#3	3	50	1.500
#4	3	50	1.500
#5	1	75	2.000
	Comuneros Square: Nº 1		
#1	1	75	2.000
#3	2	75	2.000
#5	1	75	2.000
#7	2	75	2.000
#9	2	75	2.000
#13	3	50	1.500
#15	2	75	2.000
#17	2	75	2.000
#19	3	50	1.500
#21	1	75	2.000
#23	2	75	2.000
#25	3	50	1.500
Total:	704 Buildings	1550	42.500

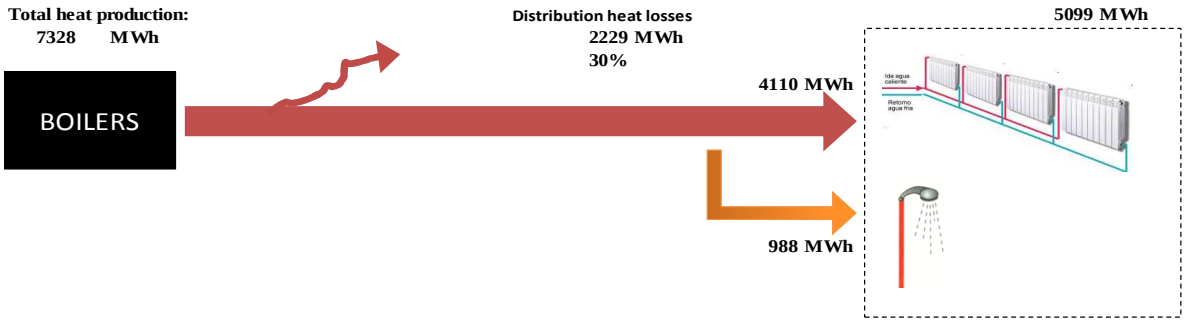
SDH energy balance (MWh)

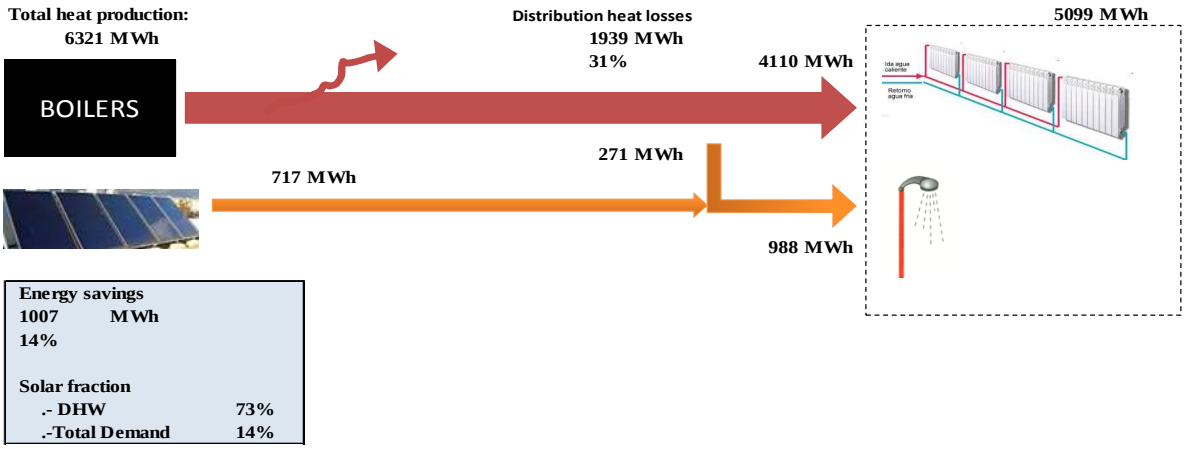
Rio Vena's 73% DHW demand and 14% total demand is covered by proposed Solar Installation. DHW Solar factor profile by month is shown in right graph below and total energy demand by solar (only DHW) and Natural Gas (DHW and SH) is shown in left graph.





Finally whole district heating energy balance is presented including influence in production and distribution loses, with and without solar installation:





Energy savings	
1007 MWh	
14%	
Solar fraction	
.- DHW	73%
.-Total Demand	14%

SDH economics

Estimated investment:
- Solar installation (1.550 m2 and 42.500 liters storage tanks),approximattely 730k €.
- Savings year: 1.000 MWh production x 30€/MWh

Taking into account low overall Natural Gas savings, solar installation only covering DHW demand is not presented really interesting for DH operator. Other solution would in order to use solar energy in this existing facilities, e.g. use for SH as well. Burgos, which is one of coldest cities in Spain has a large SH/DHW ratio, therefore, SH must be taken into account in future studies.

SDH plant opportunities & threats, benefits & limits

Threats and limits: Main limit of planned solar instalation is there is not enough space in district outskirts and both solar collectors and storage tanks should install in each building roof, being limited collectors area and tank weight could be install in them.

Photos

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Esta hoja informativa fue preparada por TECNALIA

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