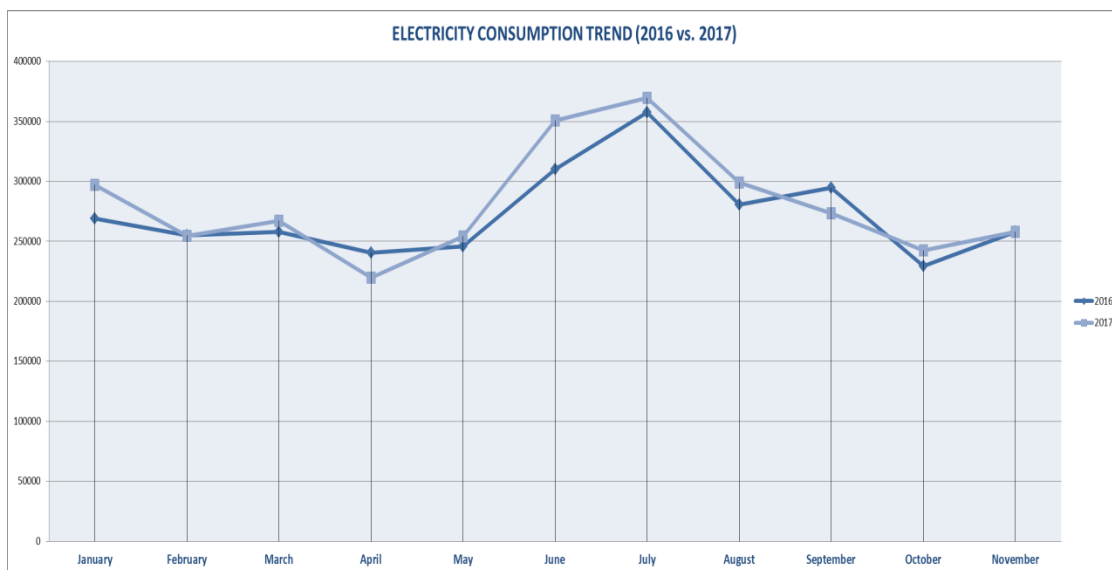


- ENERGY SAVINGS

1. Utilities Consumption

Over the course of 2017 the overall electrical consumption in the EUI premises (including EUI residences at PAB and PDM) resulted in a total of 3.263.966 Kwh*, which, compared to the available data for 2016*, shows an increase of approx. **1,08%** in absolute terms, with a budgetary increase of approx. **2.52%****: this was largely expected after the considerable savings obtained with the award of the tender for energy supply launched and contracted at the end of 2015, highlighted by the 2016 AAR, being this already the second year with the new contractor (prices are necessarily aligned, although the existing contract does not provide for a fixed price but for a fixed spread on the monthly price for energy established by the Authority: this explains why an increase in consumption of 1,08% led to different results in terms of financial expenditures).

(*/**data source: ENERGETIC monthly invoices Jan-Dec 2017, available for consultation at S:\Filing Plan\LO.01 Infrastructure and maintenance\01 Maintenance\Utilities\ENERGIA ELETTRICA)

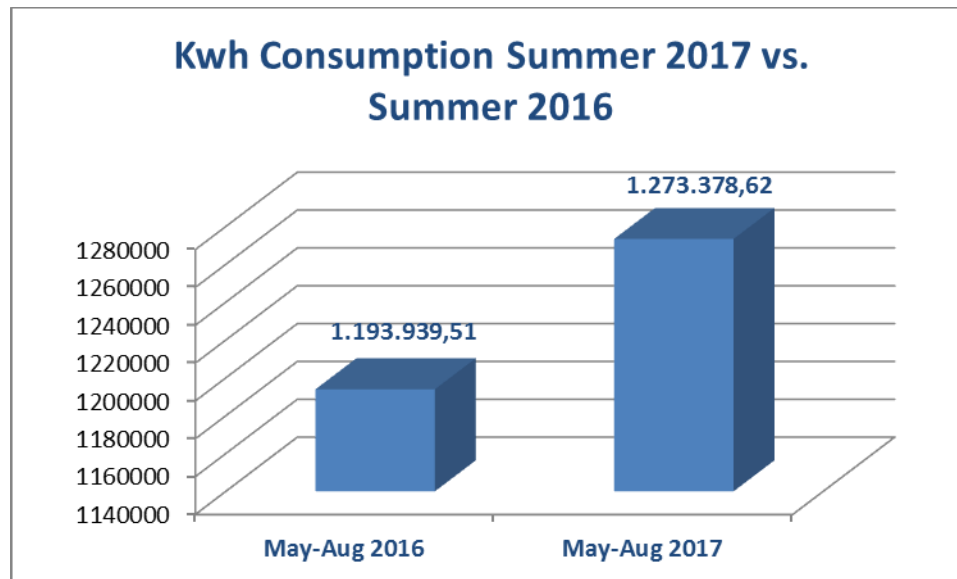


As shown in the chart above, the energy consumption trend in 2017 is almost overlapping with 2016, although the 2017 line jumps up in correspondence with the summer months (May, June, July and August), which traditionally register the most intensive consumption of electricity due to the switch on of air conditioning systems within the EUI Campus (24 May for 2017). A detailed monthly analysis shows a substantial increase, corresponding to +3,29% for the month of May



(254.016,3 Kwh vs. 245.928,3 in 2016) +13,09 % for the month of June (350.691,90 Kwh vs. 310.094,17 in 2016), +3,4% for the month of July (369.525,2 Kwh vs. 357.363,6 in 2016) and +6,63% for the month of August (299.145,2 Kwh vs. 280.552,9 in 2016), matched by a financial impact of +6,08% for the month of May (33.797,64 € vs. 31.859,76 € in 2016), +2,22% for the month of June (48.282,16 € vs. 41.078,20 € in 2016), + 1,29% for the month of July (51.759,8 € vs. 51.117,09 € in 2016) and + 14,50% for the month of August (43.816,19 € vs. 38.266,84 € in 2016).

The total increase of Kwh consumption for the period May-August 2017 amounts to 6,65% compared with 2016 (+ 79.439,11 Kwh - see chart below):



The financial impact is substantially equivalent: + 5,57%, despite having registered a considerable increase in the unit price of electricity during the month of August (+ 50% !):

August 2017 ➔ 55,77 €/Mwh

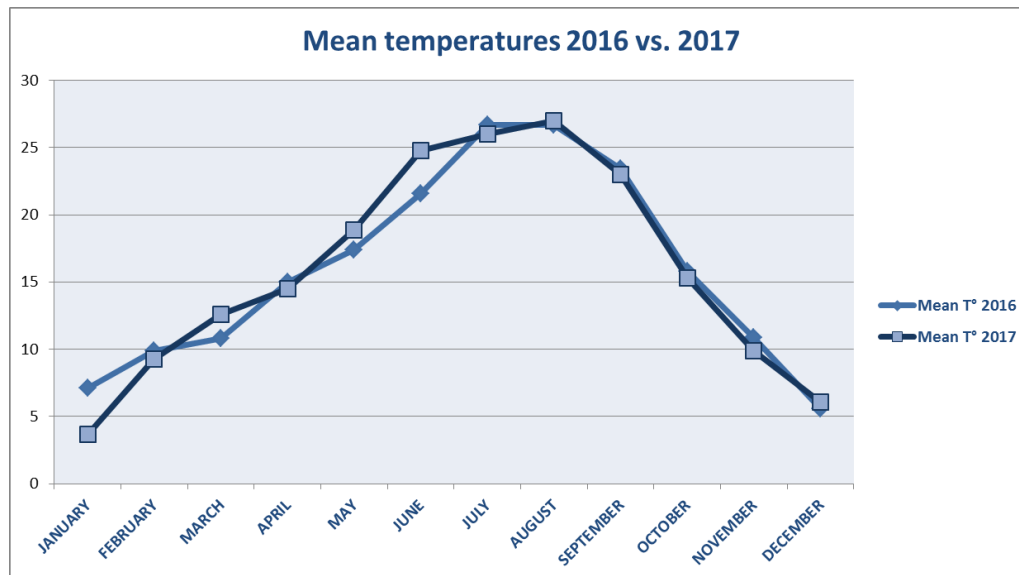
August 2016 ➔ 37,08 €/Mwh

According to climate statistics for the geographical area of Florence and its surroundings*, during the above mentioned period (May-Aug 2017) average temperatures were approx. 4,63% above the average temperatures registered during the same period in 2016 (24,17°C vs. 23,1°C - more than 1°C higher – see chart below), which would have determined the need for a decidedly increased energy consumption. It is quite evident that the highest increase in terms of pure



consumption and financial expenditure corresponds to the hottest months (June, July and August): June 2017 registered a mean temperature of 24,8°C vs. 21,6°C in 2016, and August 2017 27°C vs. 26,7°C in 2016.

*data source: www.ilmeteo.it (<https://www.ilmeteo.it/portale/archivio-meteo/Firenze/2017/>)



Now, we need to take into consideration that a reduction of 1°C for temperatures in offices/buildings implies a corresponding increase in energy consumption of about 10%: in fact, in order to keep interior temperatures compliant with the EUI heating and cooling policy, with external temperatures (t^{ext}) higher than 35°C air conditioning units must improve their efficiency according to the following formula:

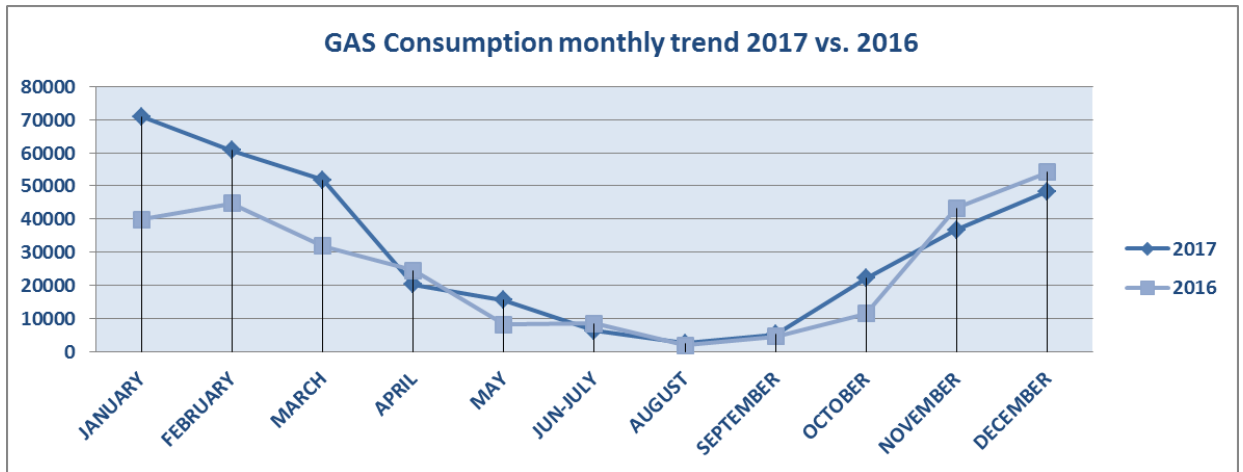
$$t^{int} \leq \frac{1}{2} t^{ext} + 11.5^{\circ}\text{C}$$

Which means that they need a higher amount of energy supply to refrigerate the environment (as already indicated, + 10% for 1°C).

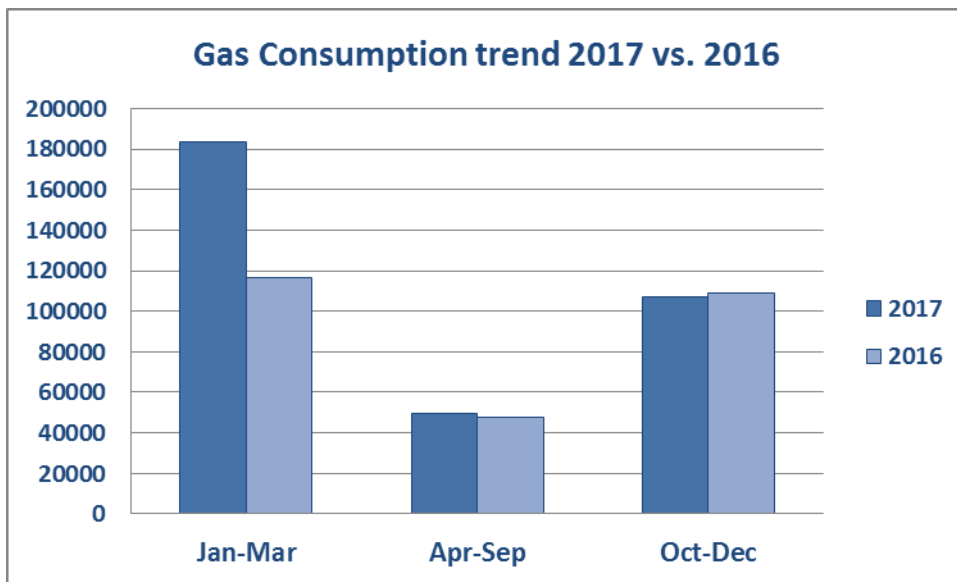
The overall increase of 6,65% is therefore to be considered a satisfactory result, as, according to what explained above, we could have expected more than +10%: the need for higher electricity consumption was in fact balanced by the correct functioning of automatic control systems, ensuring that cooling is provided to the standard required but only at the times required and only in the areas of the building where it is actually necessary.

Concerning natural gas consumption, over the course of 2017 it registered an overall increase of **24,78 %** on annual basis, although the financial impact was much less heavy due to the rationalization carried out with the award of the tender

(+5,60%).



The aggregate gas consumption in 2017 amounts to 340.551 mc vs. 272.919 mc in 2016*, but, as shown in the chart above and in the chart below, this significant growth is concentrated only in the first months of the year (January-April), with a general increase of +57%:

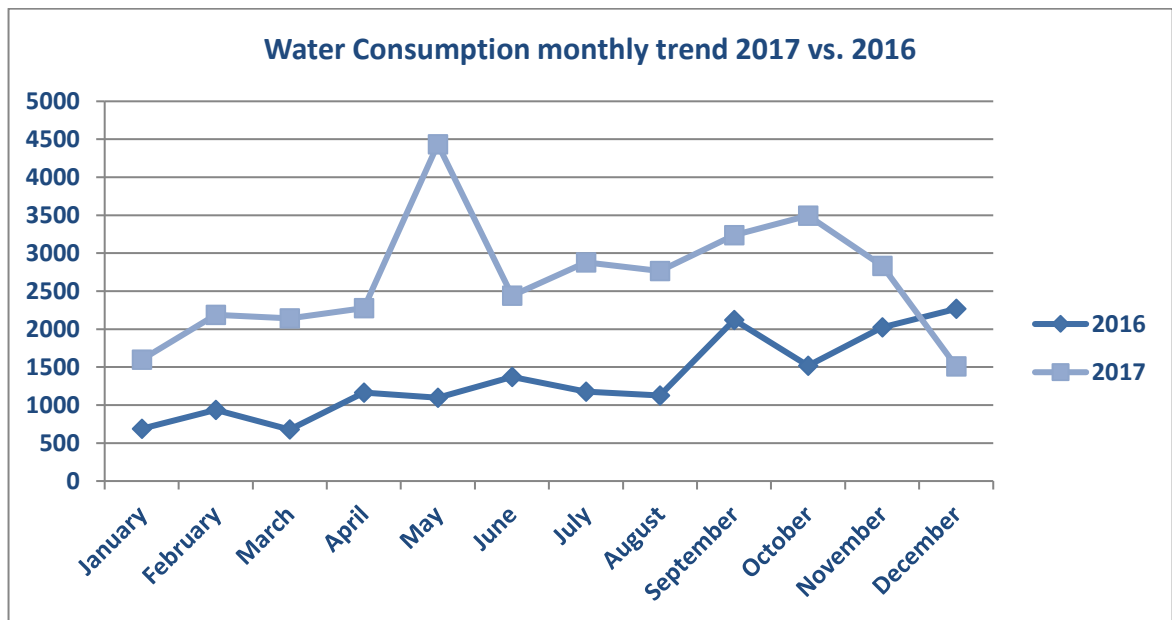


*data source: monthly reading of gas meters recorded in excel files and matched with monthly invoices by gas suppliers (S:\Filing Plan\LO.01 Infrastructure and maintenance\01 Maintenance\Utilities\GAS)

Actually the first 3 months of 2017 were much colder than in 2016 (mean temperature 8,5°C vs. 9,2°C in 2016), with particular regard to the month of January (mean temperature 3,7°C vs. 7,1°C in 2016): climate conditions being

obviously beyond our control, this explains the need for extended heating hours in some cases and the subsequent augmented consumption of natural gas.

Water consumption represents a big issue for the EUI: the aggregate volume consumed in 2017 amounts to 31.796 mc, which is almost doubled compared with 2016 (16176 mc). The monthly trend is steadily above performance all throughout 2017, with the sole exception of December (see chart below):



*data source: monthly reading of water meters recorded in excel files and matched with monthly invoices by water suppliers (S:\Filing Plan\LO.01 Infrastructure and maintenance\01 Maintenance\Utilities\ACQUA)

It needs to be pointed out that in 2017 we realized that the water meters in Villa Schifanoia and the Badia Fiesolana had been blocked for at least a couple of years (2015 and 2016) thus providing a false record of flowrate: this clarifies at least the increase of 1648% for the Badia Fiesolana and 6341% for Villa Schifanoia, to which we also have to add the detection of some leakages that were subsequently repaired at the PAB Flats and Villa la Fonte.

The thorough analysis of above mentioned records led the REFS to consider as a primary target for upcoming years the installation of automated water meters across the EUI campus, in order to gather real-time information on water consumption and eventually monitor leakages and other disruptions.



In general, comparing the 2017 energy/gas/water consumption trend with the previous year's, we can highlight a certain stability (**except for water**), in spite of climatic and/or other unexpected variables.

In terms of sustainability, the EUI 2017 carbon footprint on utilities consumption can be illustrated in the tables below*:

Electricity consumption (3.263.966 Kwh)

Pollutant	emissions (Kg)
Carbon monoxide (CO)	716,76
Carbon dioxide (CO2)	2.480.201,39
Nitrogen oxides (Nox)	5.475,62
particulates	1139,77
Sulphur oxides (Sox)	15.874,62

Gas consumption (340.551 mc)

Pollutant	emissions (Kg)
Carbon monoxide (CO)	108,98
Carbon dioxide (CO2)	660.347,97
Nitrogen oxides (Nox)	584,9
particulates	170,28
VOC emissions	116,98

*(conversion factors according to ANPA, Banca dati I-LCA ver. 2.0, 2000 – Rapporto ETH-ESU, 1996):

PI on Energy Management = BE (Buildings efficiency)*

BE = 19.20 €/sqm

(The BE value for 2015 was 20.09 €/sqm)

*the value is obtained by dividing the 2017 overall utilities cost for the total sqm surface of the EUI.