

Figure 9 shows the total monthly electrical consumption of the house by use. It can be appreciated that the household electricity is quite constant along the year and represents between 45.5% (in January) to 80.8% (in August) of the total consumption of the house.

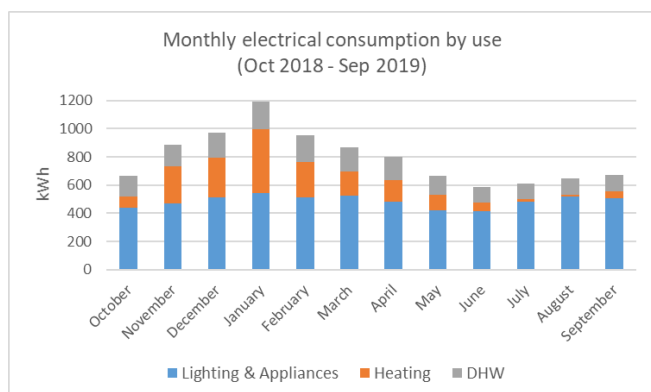


Fig. 9. Monthly electrical energy consumption by use

Figure 10 shows the share of the annual electrical consumption by use. It can be seen that more than half of the total electrical consumption is due to lighting and appliances, and the rest is quite balanced between DHW and space heating.

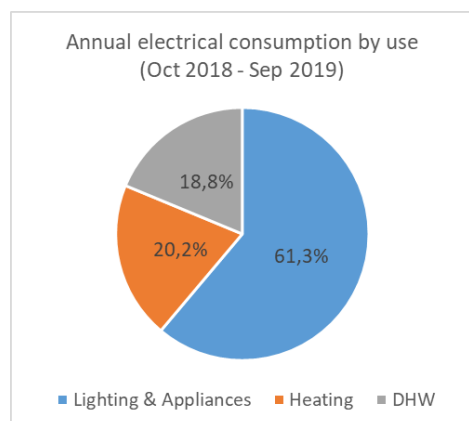


Fig. 10. Annual electrical energy consumption by use

Additionally to the consumption of electricity, 241 kg of pellets are consumed from November to February, equivalent to 884 kWh_{PEL}.

E. Assessment of Passive House Standard energy consumption limits

Table V summarizes the annual consumptions per usable surface of the house in terms of final energy (electricity and pellets) and primary energy, showing that the former is quite above and the latter is below the corresponding limits specified by the Passive House Standard.

Table V. – Parameters limited by the Passive House standard (SHD: Space Heating Demand – FE: Final Energy PE: Primary Energy –PH: Passive House)

| kWh/m ² year | Electricity | Pellets | Total | PH limit |
|-------------------------|-------------|---------|-------|----------|
| SHD | 16.2 | 3.4 | 19.6 | ≤15 |
| FE | 40.9 | 3.8 | – | – |
| PE | 98.2 | 4.2 | 102.5 | ≤120 |

5. Conclusions

The energy consumption and thermal performance of a Passive House is firstly analysed under northern Spanish climate. The study covers a period of fifteen months and the measurements show a high thermal comfort in terms of indoor temperature and relative humidity. Regarding the space heating demand and the primary energy consumption per treated floor area and year, they are around the maximum limits specified by the Passive House Institute standard, the former quite above and the latter quite below. Finally, these two parameters are 3.5 times greater that the corresponding values calculated in the design stage with the Passive House Planning Package, results that are in accordance with other published works. This gap between the performance of the house under real conditions and the PHPP predicted performance is due, basically, to the dependence of the energy consumption on uncontrolled aspects, as the weather conditions or the occupants' behaviour (comfort set point of temperature, type and use of lighting and appliances, etc.).

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