**General**

As the house is 1600 square feet, we suppose that it can accommodate four people, and each of them take a shower or bath every day in summer, which means that water heater works for about one hour a day in summer. Since the water heater requires a constantaneous power rating, the amount of which varies according to the season, it should be considered as a constant requirement.

**Model A1**

To calculate the energy storage system, we need the exact time and power rating (both instantaneous and constantaneous) of each electrical appliance. In our model, we take into account in all seven electrical appliances, the features of which are supposed and listed in the chart below.

|  |  |  |
| --- | --- | --- |
|  | Working hours | Power (kW) |
| Lights | 17:00-22:00 | 0.2 |
| Refrigerator | 00:00-24:00 | 0.3 |
| Air conditioner | 00:00-24:00 | 0.8(max)→0.4(avg) |
| Bathroom master and water heater | 21:00-22:00 | 3.5\* |
| Television | 19:00-22:00 | 0.2 |
| Desktop | 18:00-23:00 | 0.2 |
| Cooker | 7:30-8:00  11:30-12:30  18:00-19:00 | 1.5 |
| \*Bathroom master is both instantaneous (only in winter) and constantaneous (one hour every day), it should be considered as constantaneous. | | |

1. Lights

The 0.2kW isn’t the total power rating of all the lights, but is calculated by the overall usage of all rooms.

1. Refrigerator
2. Air conditioner (AC)

We suppose that there are four ACs, three of which are in room and work all day and the one in the sitting room is off at night. All AC units work about half of the on time.

1. Bathroom master and water heater (BM&WH)
2. Television (TV)

Each room has a TV. The one in the sitting room and one in a bedroom work together at a time.

1. Desktop
2. Cooker