



PRACTICAL TIPS FOR SAVING ELECTRICITY AND WATER



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1 INTRODUCTION TO THE SMARTKALEA PROJECT

SmartKalea is an innovative project headed by Fomento de San Sebastián with a public-private partnership model that integrates the different agents that coexist in a city environment from a Smart perspective: citizens, businesses, technology companies and municipal departments, under the coordination of Fomento de San Sebastián.

It is a pilot project involving smart implementations to test and validate this model so that it can be expanded to other geographical areas and turn the city of San Sebastian into a reference point for smart implementations. More specifically, SmartKalea is promoting environmental sustainability, energy efficiency, citizen participation and transparency by using state-of-the-art technology from local technology partners.

The information below provides practical tips to encourage energy and water savings in homes and businesses.

2 ENERGY CONTRACTS

2.1 Find out the consumption of each home

Regardless of the contracted supply provider, anyone can register free of charge on the Iberdrola distribution portal (<https://www.i-de.es>), and access the hourly consumption records of their home.

A profile of energy consumption can be obtained, showing consumption broken down by hours. Consumption can be compared for different days, weeks and months and conclusions can be drawn from the use of household appliances and electrical appliances in the home for the purposes of optimising energy consumption. At the same time it is possible to see the contracted power supply and maximum power requirements on a monthly basis, thus making it possible to adjust the power terms.

2.2 Contracted power supply

Do not contract more power than necessary. 65% of supplies have contracted more power than they need. **Do not pay more for more power than you need.**

2.3 Find out the contracted rate

It is a good idea to know the type of tariff contracted and whether you have a tariff in the free market or in the regulated market (PVPC - voluntary price for the small consumer). The free market is the marketers who determine the price of energy. The price does not depend on the day or time of use of the energy, so the price does not vary and is known when the contract is signed, in addition to any discounts offered by the companies. In the PVPC tariff or regulated market, the price of energy constantly changes and the price is set by the Ministry of Industry, Trade and Tourism.

2.4 Time-of-use tariff

2.4.1 What is a time-of-use tariff?

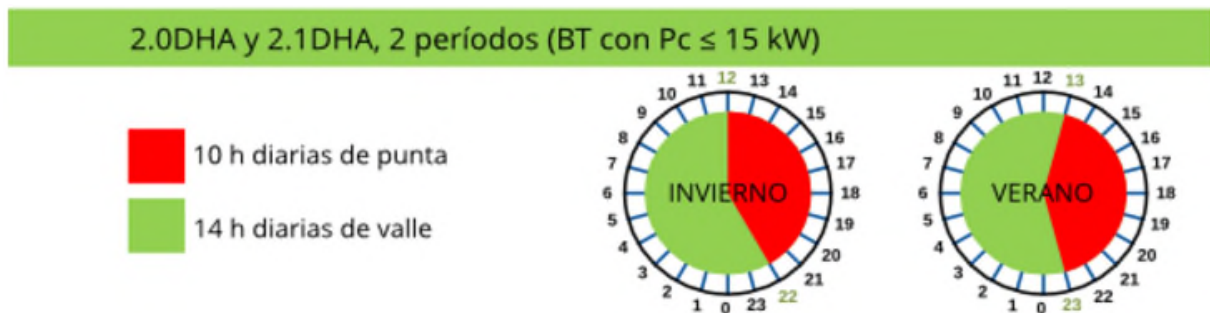
A time-of-use tariff is a way of contracting electricity that is usually offered by all electricity companies.

A time-of-use tariff can be in two periods (peak and off-peak) or three periods (peak, flat rate and off-peak) with three price rates. The cheapest prices are those for flat rate and off-peak hours, which can be between 20 and 35% cheaper.

Time-of-use tariffs are designed for users who consume more electricity during the night, as they are not at home most of the day.

These tariffs are characterised by having different prices for the electricity consumed depending on the time when it is needed (low price in off-peak hours and high price in peak hours). It is different from the conventional tariff, which has the same price for all hours of the day and is the one that most consumers contract by default nowadays.

The image below shows an example of a time-of-use tariff in two periods:



* El cambio de horarios entre verano e invierno se realiza con el cambio oficial de hora.

2.4.2 How much can you save with a time-of-use tariff?

The greater the electricity consumption in the off-peak period, the greater the savings in electricity bills, as the minimum possible is being paid for this energy, as can be seen in the interesting table below on contracting a time-of-use tariff, which shows the percentage of consumption in the off-peak period.

EJEMPLO: COMPARATIVA 2.0A (Sin discrim. Horaria) ÷ 2.0DHA (Con discrim. Horaria)							
2.0A	2.0DHA	2.0DHA	% consumo	% consumo	Precio	Tarifa	Ahorro
Precio único	Precio Punta	Precio Valle	período caro	período barato	medio final	más rentable	respecto 2.0A
0,12802	0,151367	0,079295	100%	0%	0,151367	2.0A	-18,24%
0,12802	0,151367	0,079295	90%	10%	0,1441598	2.0A	-12,61%
0,12802	0,151367	0,079295	80%	20%	0,1369526	2.0A	-6,98%
0,12802	0,151367	0,079295	70%	30%	0,1297454	2.0A	-1,35%
0,12802	0,151367	0,079295	60%	40%	0,1225382	2.0DHA	4,28%
0,12802	0,151367	0,079295	50%	50%	0,115331	2.0DHA	9,91%
0,12802	0,151367	0,079295	40%	60%	0,1081238	2.0DHA	15,54%
0,12802	0,151367	0,079295	30%	70%	0,1009166	2.0DHA	21,17%
0,12802	0,151367	0,079295	20%	80%	0,0937094	2.0DHA	26,80%
0,12802	0,151367	0,079295	10%	90%	0,0865022	2.0DHA	32,43%
0,12802	0,151367	0,079295	0%	100%	0,079295	2.0DHA	38,06%
0,12802	0,151367	0,079295	68%	32,4%	0,12802	-	0,00%
A partir de un consumo del 32,4% en periodo valle, sale rentable la tarifa							2.0DHA

2.5 Legislation

From November 1, 2020, compulsory time-of-use tariffs will come into force. Consequently, domestic tariffs will have 3 energy billing period types and it will be possible to contract 2 equal or different electrical power throughout the day. These billing periods will have different prices depending on the time of day and day of the week.

The image below shows the hours in the year for the three periods: P1 peak period, P2 flat rate period and P3 off-peak period:

Invierno y verano (lunes a viernes laborables)					
Península, Illes Balears y Canarias			Ceuta y Melilla		
P1	P2	P3	P1	P2	P3
10 h-14 h 18 h-22 h	8 h-10 h 14 h-18 h 22 h-24 h	0 h-8 h	11 h-15 h 19 h-23 h	8 h-11 h 15 h-19 h 23 h-24 h	0 h-8 h

3 LIGHTING

3.1 Things to bear in mind before selecting an LED system

In recent years, technology has made significant advances in terms of energy efficiency. Today there is equipment available on the market that offers the same performance while consuming less energy. One of these technologies is LED. They do not have a filament, so they have a long life and are very resistant to getting knocked (up to 80,000 hours). Furthermore, they are 80 % more efficient than incandescent light bulbs. This means that, even though it is expensive, for installations that operate for many hours, the investment involved in replacing them is worthwhile, thanks to the energy and maintenance savings.

Before embarking on a definitive renovation of this part of the installation, it is advisable to seek professional advice in order to identify the models and performance of the lights that will meet your requirements.

Some of the things to bear in mind when selecting a new LED lighting system are described below.

3.1.1 Optics

The optics describe the **strength** of and **where** you want to direct the light beam. LED technology **makes it possible to direct the light beam** where you want it, provided that it has been designed with these parameters in mind. **Sending light only where it is needed** allows you to light the same place while consuming less energy.

This parameter is closely related to the efficiency of the bulb, which is measured in lumens / Watts (light output per unit of power consumption). **Today, an efficiency of at least 80 lm/W is required.**

The table below compares the efficiency of the most widely used technologies at the present time.

	Incandescencia	Halogenas	Fluorescente	Fluoresc. Compacta (bajo consumo)	Halogen Metálico	LED
η luminico (lm/W)	10-20	25	60-80	57-65	56-89	45-95

3.1.2 Electrical consumption

The table below compares the electricity consumption of different types of lighting for the same lighting level:

LÚMENES (brillo emitido)	INCANDESCENTE 	HALÓGENA 	FLUORESCENTE 	LED 
200 lm	25W	18W	7W	3-4W
450 lm	40W	29W	9W	4-6W
800 lm	60W	43W	14W	7-9W
1100 lm	75W	53W	19W	9-10W
1600 lm	100W	72W	23W	10-15W

3.1.3 Heat dissipation

When selecting an LED light, it is very important to select one with a good heat dissipation capability, because the efficiency of the heat dissipaters will make the lifespan of the light longer or shorter. **Today, a lifespan of at least 50,000 hours is required.**

The table below compares the lifespan of the most widely used technologies at the present time.

	Incandescencia	Halogenas	Fluorescente	Fluoresc. Compacta (bajo consumo)	Halogen Metalico	LED
Vida útil (horas)	1000	3000	7500	5500-10000	9000	80000

3.1.4 Colour rendering index (CRI)

Natural outdoor lighting has a colour rendering index (CRI) of 100 and, therefore, is the standard for comparing any other lighting source. The higher the CRI (on a scale of 0 to 100), the more natural colours appear.

Therefore, particularly in commercial establishments, it is important to ensure that the CRI of the lights selected is of sufficient quality, because otherwise viewing the colours of the products on display will not be optimal and will be a factor that will have a negative effect on sales. **Today, a CRI of at least 90 is required.**

The table below compares the CRI of the most widely used technologies at the present time.

	Incandesce ncia	Halogen	Fluorescent e	Fluoresc. Compacta (bajo consumo)	Halogen Metalico	LED
IRC	100	100	60-70	70-80	70-90	80-95

4 HOUSEHOLD APPLIANCES

4.1 Electricity savings

The following tips are recommended to minimise the consumption of household appliances:

1. Use highly energy-efficient appliances (A++, A+++, etc.)
2. Make the most of natural light.
3. Turn off lights when rooms are unoccupied.
4. Put the lid on pots and pans when cooking in order to take less time.
5. Take advantage of the residual heat from the oven and glass by turning them off before finishing cooking.
6. Iron clothes in one go to avoid the need to reheat the iron several times.
7. Fill the washing machine to maximum capacity for every wash, preferably at 30°C and with a short spin cycle.
8. Do not use a drier.
9. Eliminate “stand-by” by using a power strip to completely disconnect unused devices, especially for long periods (night, holidays, etc.).

4.2 Fridges and freezers

The fridge is the most energy-consuming household appliance. Class A+ covers all appliances that consume less than 44% of the average consumption of an equivalent appliance and class A++ covers those that consume less than 33%. Class A+++ models, which are currently the most efficient on the market, consume less than 22% of a conventional model.

1. Do not buy a larger piece of equipment than you need.
2. Put the fridge or freezer in a cool, well-ventilated place, away from possible heat sources: solar radiation, oven, etc.
3. Clean the back of the appliance at least once a year.
4. Defrost before any layers of ice are 3 mm thick: you can achieve savings of up to 30%.
5. Never put hot food in the fridge: if you let it cool down outside, you will save energy.
6. When you take food out of the freezer for consumption the next day, thaw it in the fridge compartment instead of outside; this way you will have a free benefit of extra cooling.
7. Set the thermostat to maintain a temperature of 5°C in the fridge compartment and -18°C in the freezer compartment.
8. Open the door as little as possible and close it quickly so as to avoid wasting energy.

5 COMPUTER EQUIPMENT

When it comes to replacing electrical equipment such as computers and printers, it is recommended that you pay special attention to acquiring the most efficient one on the market.

In addition, it is recommended that you pay particular attention to not leaving computers on or in stand-by mode outside of normal operating hours. These measures also provide additional savings, as they reduce the thermal load for offices with air-conditioning equipment.

6 HEATING AND AIR CONDITIONING

6.1 Controlling temperature and time settings

It is recommended that you reassess temperature and time settings. It is therefore essential to have a thermostat to programme the heating. To start with, set shorter operating hours, delaying the start-up time and making the switch-off earlier, but always maintaining a comfortable temperature. **Bioclimatic strategies can also be used to reduce operating times and temperatures.**

The comfortable air temperature criterion to be followed is shown below:

- a) **The air temperature in heated rooms should not exceed 21°C**
- b) **The air temperature in cooled rooms should not be lower than 26°C**

It is recommended that you set the thermostat to 20°C, which is the ideal temperature for the house. It should be noted that for every °C that the temperature set point is increased when the heating is on or decreased when the cooling is on, the installation requires an additional consumption of 7%. Try to wear the appropriate clothing to stay comfortable. At night, it is advisable to turn the heating off or reduce the temperature to 17-19°C and remember to turn the heating off if the house is going to be unoccupied.

It is advisable to programme two heating modes, so as to prevent the house from cooling down to below a certain level (e.g. 15°C), from which it is difficult to recover a comfortable temperature.

6.2 Maintaining the air conditioning/heating systems

Proper **maintenance of the air-conditioning/heating systems, regularly checking all of the installation's components**, will prevent unnecessary energy consumption due to the equipment malfunctioning. The most important points to consider are outlined below:

- Check the coolant levels.
- Bleed the radiators.
- Insulation.
- Clean the exchangers.
- Clean the filters.
- Check the control system.
- Check the performance of the equipment.

6.3 Heating

Nowadays the most efficient boilers are condensing boilers, but to benefit from their advantages, they need to be operating in condensing mode, i.e. at a low temperature. Therefore, water must not be pumped from radiators at a temperature of more than 50°C. Using this method of operation, it should be possible to save 15%, approximately 150 euros per year.

Ventilate the house, but do not overdo it. You only need ten minutes to ventilate the whole house, if possible. Do not do it when it is very cold and look for moments when the sun comes out.

Zoning the heat is essential, as it prevents the cold from being dispersed around the house. The habit of closing doors to rooms which we are not using generates small amounts of heat in those we are using, providing more comfort at home.

Do not ignore the sun: Ideally, when the sun shines on the house, all the doors and windows should be closed, but with no obstacles preventing light from entering, such as blinds or curtains (this time we

benefit from the greenhouse effect). Do not open the windows, as the heat that has gradually built up in the house will disappear.

Lower the shutters and close curtains at dusk to avoid losing heat from the building.

Rugs: The floor is one of the construction elements that has the greatest energy loss. In winter, the average temperature is 10 or 12 degrees, while in summer it rises to 14 or 16. We recommend using textile solutions, such as rugs, which, although they are not insulating, preserve high temperatures. However, the ideal floor for fighting the cold is hardwood or carpet, both of which are more comfortable and warmer than marble floors.

Do not cover or obstruct **radiators** with furniture and avoid putting objects on top of them, as the air has to circulate to perform its function properly.

We recommend using **thermostatic valves** on radiators in rooms, which control the heat supply in each room depending on needs, thereby making it possible to make energy savings of between 5 and 10%.

7 SAVINGS OF HOT AND COLD WATER

Savings come from rationalising water consumption. To do this:

- Do not leave the taps on unnecessarily (when washing, shaving, brushing your teeth). This wastes 10 litres per minute.
- Only use hot water when necessary.
- A shower consumes about four times less water and energy than a bath. Bear that in mind.
- There are low-consumption shower heads on the market that allow for comfortable showering, using half the water and therefore half the energy. It is possible to save up to 70% of water and energy by using these heads and improving comfort.

7.1 Reference values

Each person consumes an average of 105 litres of water per day.

- The toilet cistern consumes about 8-10 litres every time it is flushed.
- A 3-minute shower consumes 54 litres.
- Washing your hands carefully requires 10 litres.
- The dishwasher uses between 7 and 18 litres.
- The washing machine uses between 40 and 70 litres.