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PRACTICAL TIPS FOR SAVING ELECTRICITY AND WATER

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Donostia-San Sebastián

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CONTENT

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 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.**

2.2 Time-of-use tariff

2.2.1 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.*

2.2.2 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 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**

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	Halogena	Fluorescente	Fluoresc. Compacta (bajo consumo)	Halogen Metalico	LED
ηluminico (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	Halogena	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.

	Incandescencia	Halogena	Fluorescente	Fluoresc. Compacta (bajo consumo)	Halogen Metalico	LED
IRC	100	100	60-70	70-80	70-90	80-95

4 INDUSTRIAL REFRIGERATION

4.1 Refrigerators & freezers

Refrigerators and freezers will be more efficient if you follow these **energy-saving tips**:

- Hot foods should be cooled to room temperature outside the refrigerator/freezer and only then transferred inside.
- There are magnetic systems that detect when the refrigerator/freezer doors are open and turn strobe lights on. Unlike beeping alarms, strobe lights are not annoying at all.
- The defrost mode and timer should be checked and adjusted to actual needs.
- Heat exchangers in refrigerator units should be kept perfectly clean.
- Setting the refrigerator/freezer thermostat at the optimal point is an effective energy-saving behaviour. A set point 5 ºC lower than the required temperature increases energy consumption by 25 %.
- Temperature sensors should be installed far from refrigerator/freezer doors so that they are not affected when the doors are open.
- Condensers should be in a well-ventilated area, not exposed directly to the sun or hot airflow.
- Maintenance of industrial refrigeration systems:
    - The pressure of the refrigerant should be at the level recommended by the manufacturer. If there is little refrigerant, the compressor will be required to work more, but if there is too much refrigerant, the compressor will be overworking and using more energy.

- **Regularly remove ice build-up in the freezer.** Defrost the freezer before the ice layer thickness is 3mm to **save up to 30 % energy**.
- The lubricant level should be kept as recommended by the manufacturer. If there is little lubricant, the compressor gets hot, and the heat is transferred to the refrigerant, which can cause the compressor to overwork.
- Regular checks and inspection should be made of refrigerating equipment and its parts. Special attention should be paid to the refrigerator doors; their proper closing and sealing.
- Defrost the evaporator periodically. The covering of frost or ice that builds up acts as a thermal insulator that hampers normal functioning. Defrosting should be performed during off-peak periods, when electricity rates are low.
- If you are about to buy a new refrigeration unit, look for the most efficient available, since they **use 70 % less energy** than regular ones.

Following these recommendations, you **can save more than 15 % on your electricity bill**.

4.2 Bioclimatic design

Bioclimatic architecture is the design of buildings based on local climate and environmental sources (sunlight, vegetation, rainfall, wind) to provide thermal comfort. It makes use mainly of natural sources for heating, cooling and lighting. Heating, cooling or lighting systems consuming gas or electricity are used only as backup systems.
A good way of cutting down on energy usage consists in using **natural ventilation** to manage thermal load in our store.

5 AIR CONDITIONING

5.1 Timer and thermostat settings

A good way to improve energy efficiency consists in resetting heating/cooling timers and temperatures. To start with, you can switch your heating/cooling system on one hour later than usual and off one hour earlier, while keeping room temperature comfortable.
The Regulations for Thermal Installations in Buildings (Royal Decree 1027/2007, of July 2007, regulating heating/cooling/ventilation in buildings), framed within the Energy Saving and Efficiency Plan 2008-2011, among other measures aimed at reducing energy consumption, states a range of **required** indoor temperatures for different types of buildings:

a) *Offices.*

b) *Retail stores: shops, supermarkets, department stores, shopping centres, etc.*

c) *Buildings open to the public:*

- *Buildings running cultural events: theatres, movie theatres, convention centres, galleries, etc.*
- *Buildings hosting shows and recreational activities.*
- *Bars, restaurants and coffee houses.*
- *Train stations, airports, etc.*

The recommended range of temperatures does not apply to buildings with special needs or to those that must comply with other special conditions. These buildings must be physically insulated, so that the adjoining buildings can comply with indoor temperatures as required by the Regulations.
Room temperature criteria set forth in I.T. 3.8.2:

Comfortable room temperature criteria are:

a) Comfortable temperature in heated rooms should be 21 ºC or lower where the heating system uses conventional energy sources.
b) Comfortable temperature in cooled rooms should be 26 ºC or higher where the cooling system uses conventional energy sources.

For **every 1 ºC you turn your thermostat up when heating or down when cooling**, the system uses **7 % more energy.**

5.2 Door opening

The above-mentioned Royal Decree also contains recommendations for door opening (I.T. 3.8.4).
"Buildings and retail stores with direct access from the street shall have a commercial door closer, that is, a mechanical device that closes the door after someone opens it. Door closers help save heating and cooling energy, as they prevent cold air from venting out or getting into spaces when cooling/heating units are on."

5.3 Heating/cooling system maintenance

Your heating and cooling system requires proper care and maintenance. Check all parts regularly to avoid unnecessary energy consumption. These are useful maintenance tips for taking care of your heating/cooling system:

- Check levels of refrigerant.
- Test for leaks.
- Clean exchangers.
- Clean filters.
- Check for accuracy of thermostat.
- Check overall performance.

5.4 Solar control

In shops with large glazed areas, using traditional awnings or more modern **polarised glass** or solar control films can reduce solar heat gain while letting the sunlight in. This is an easy way to lower your air conditioning bill by 25 %. With a solar control method, you can save up to 90 % on your bill.

6 WATER USAGE

Commercial properties such as hair salons, restaurants, bars, etc. which use a large amount of water should **replace existing taps by water eco solutions** that reduce water flow to 5L/min. These systems help save water, increase comfort and reduce power consumption.
Water-efficient solutions are easy to install, since they come with a standard thread to be fitted to existing taps. **Comfort is not compromised with these gadgets, which can save up to 80 % water**, depending on water pressure.