Power consumption in STAND-BY mode

Introduction

An average household uses many electrical appliances, for example a fridge, a washing machine, a microwave, a kettle, a computer, a modem, a television and others. All these devices consume a certain amount of electricity, depending on their energy class. But what happens when we are not at home, e.g. at school, work, or on vacation, and devices stay in stand-by mode? If we do not switch them off completely their consumption will decrease, but they will still consume a small amount of electricity constantly. Taking into account millions of appliances in stand-by mode around the world, this is an unnecessary waste of our natural resources that are used to produce that electricity.

Learn about the problem

Use the internet, (scientific / popular) literature, or in collaboration with experts to find available information on wasting electricity with appliances that are in stand-by mode. Also focus on the following questions:

- What is a STAND-BY mode?
- What are the sources for creating electricity in your country?
- What percent is renewable energy and how much is non-renewable?
- How many households are registered in your country?
- What is the average household electricity consumption in your country?
- What is the cost of 1 kWh of electricity in your household?

Recommended resources

Source 1: Preventing energy loss

Source 2: Household energy consumption

Source 3: Energy efficiency benefits us all

Verify the occurrence of a problem in your area with your own research

Goal

Students know what a STAND-BY mode is. They can calculate how much electricity the appliances consume in their household switched in this mode. Students realise that this is a waste of electricity and by changing their behaviour they can save natural resources and family budgets.

Tools & Materials

- recording card
- list of devices in stand-by mode and their consumption in stand-by / off mode (Table no. 1)
- a board / flipchart / tablet or similar
- calculator
- camera / mobile to record activity

Implementation

Before starting the measurement, ask your parents what price you pay in the household for 1 kWh of electricity. You will use this value to calculate the cost of energy consumed. Your parents can also help you to write down all the electrical appliances you have in your household and keep them plugged in stand-by or off mode.

When calculating, be careful to use the same units of measurement.

Measurement

When completing the recording card, assign the average electricity consumption of each appliance using Table no. 1 and write down the number of each appliance that you have in your household. Then consider how many hours of the day this appliance is on STAND-BY / OFF mode. By using the formula in the recording card, calculate how much electricity your appliances spend is per year and how much money you pay unnecessarily for consumed energy. Finally, count the values of the entire class together and also calculate the average electricity consumption for your class, compare this against your household.
Based on the number of households in your country, calculate how much electricity would be unnecessary consume if all residents behaved in the same way as your class. Just multiple the average electricity consumption of your class and the number of households registered in your country.

Analysis of results and proposal of solution

What values have you calculated within your household and for the class? Why can't we disconnect all household appliances from the mains? Were you surprised by the amount of money or kWh that your appliances consume in 1 year even though they are not being used? What could you buy with this saved money? What solutions would you propose? Discuss ways to avoid unnecessary electricity consumption. Write down your suggestions and select the ones you can implement.

Implementation of the solution and evaluation

Did you manage to implement the selected solutions? What is the estimated electricity saved (in kWh and € / £)? What was the opinion of family members on your efforts? Were they willing to cooperate? Do you think there are other ways to save electricity? If so, what are they? Can you share your results with other students and implement some solutions at your school (e.g. computer laboratory)?

How did you feel after implementing the selected solution?

Frustrated	**Disappointed**	**Rather Negative**	**Neutral**	**Rather Positive**	**Satisfied**	**Enthusiastic**
○	○	○	○	○	○	○

Publicity

Record and share photos on social networks with #mybioprofile during the activity.
Help others to join us.

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Table no. 1: Average electricity consumption of selected appliances

Appliance (OFF/STANDBY mode)	Average power consumption kWh	Appliance (OFF/STANDBY mode)	Average power consumption kWh
Air Conditioner, room/wall	0,0009	Set-top Box, satellite	0,01566
Charger, mobile phone	0,00026	Speakers, computer	0,00179
Clock, radio (ON)	0,00201	Stereo, portable	0,00166
Computer Display, CRT	0,01214	Television, CRT	0,00306
Computer Display, LCD	0,00138	Television, rear projection	0,00697
Computer, desktop	0,02113	Timer, irrigation	0,00284
Computer, notebook	0,01577	Tuner, AM/FM	0,00112
Fax, laser	0,00642	Amplifier	0,00027
Modem, DSL	0,00137	Audio Minisystem	0,00832
Modem, cable	0,00385	CD Player	0,00504
Multi-function Device, inkjet	0,00526	Caller ID Unit	0,00127
Multi-function Device, laser	0,00312	Coffee Maker	0,00114
Night Light, interior	0,00022	Copier	0,00149
Phone, cordless (handset)	0,00281	DVD Recorder	0,00075
Phone, cordless (no handset)	0,00158	DVD Player	0,00155
Phone, cordless with answering machine (handset)	0,004	DVD/VCR	0,00504
Phone, cordless with answering machine (no handset)	0,00282	Game Console	0,02334
Printer, inkjet	0,00126	Garage Door Opener	0,00448
Printer, laser	0,00158	Microwave Ovens	0,00308
Scanner, flatbed	0,00248	Musical Instruments	0,00282
Security Systems, home	0,0027	Receiver (audio)	0,00292
Set-top Box, DVR	0,03668	Telephone Answering Device	0,00225
Set-top Box, digital cable with DVR	0,04346	Television/VCR	0,00515
Set-top Box, digital cable	0,01783	Turntable (audio)	0,0002
Set-top Box, satellite with DVR	0,0278	VCR	0,00468

Source

Example

Recording card					
Name	John Doe				
Class	8.A				
School	Leonardo´s Elementary School				
City	Florence				
Appliance	**Average power consumption (APC)**	**Number of hours in stand-by/off mode (H)**	**Number of appliances (N)**	**Power consumption per year (PC)**	**Price for electricity**
	-	-	-	(APC*H*N*365 = PC)	[PC*(price/kWh)] = P)
	kWh	H	number	kWh	€ / £
Game Console	0,02334	22	1	187,42	12,44
Computer, notebook	0,01577	20	1	115,12	7,64
Television/VCR	0,00515	19	1	35,72	2,37
Summary		**61**	**3**	**338,26**	**22,46**

Recording card - Power consumption in STAND-BY / OFF mode

Recording card					
Name					
Class					
School					
City					
Appliance	**Average power consumption (APC)**	**Number of hours in stand-by/off mode (H)**	**Number of appliances (N)**	**Power consumption per year (PC)**	**Price for electricity**
	-	-	-	(APC*H*N*365 = PC)	[PC*(price/kWh)] = P)
	kWh	h	number	kWh	€ / £
Summary					