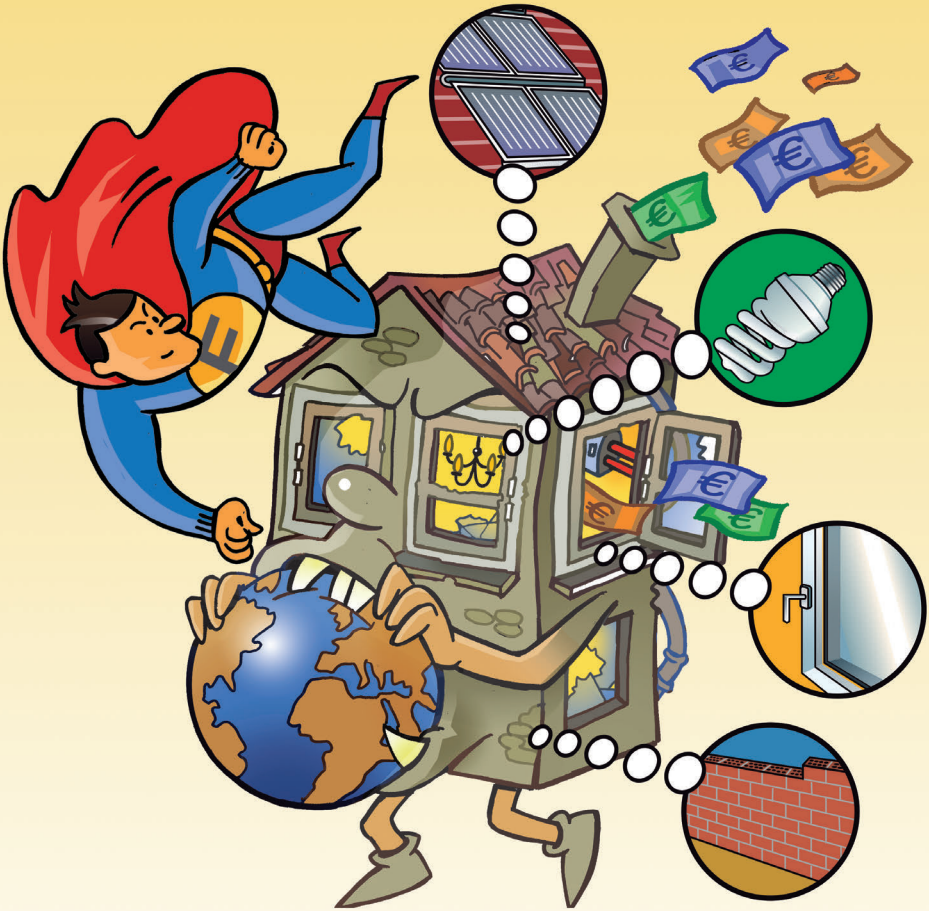
FIESTA

energy efficiency guide



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FAMILIES INTELLIGENT ENERGY SAVING TARGETED ACTION

Co-funded by the Intelligent Energy Europe Programme of the European Union

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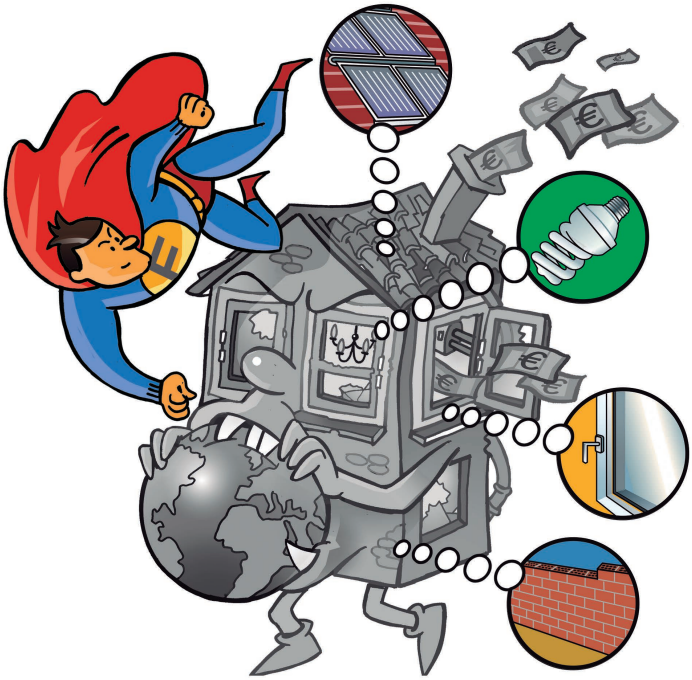

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Co-funded by the Intelligent Energy Europe Programme of the European Union

Edition and publish:
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Authors:
Ana Allué Poc
Jesús Valero Gil
Sabina Scarpellini

Coordination and supervision:
Fabio Tomasi
Anja Starec
Fabio Morea
Elena Banci
AREA SCIENCE PARK - Trieste (Italia)

Illustrations:
Alfonso Val Ortego
K-STUDIO

Graphic design and layout:
Antonio Pisa

Contract: IEE/13/624/SI2.687934

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FIESTA energy efficiency guide

Energy is an essential element in our daily life and, often, we aren't aware of the huge value of this resource. Whether it is electricity or heat, it makes living more comfortable. Usually, we think about the energy cost just as an additional bill to pay, without considering that it takes a high toll on environment. The FIESTA project would help you consider that things can change: there are very easy ways to save money at home and achieve a more sustainable way of life.

Why should you read this guide?

This guide can help you if:

- You want to start saving on your energy bills.
- You would really love to feel more comfortable at home without spending a single cent.
- You would like to know if you're being environmental friendly.
- You're thinking about changing some devices, equipment or refurbishing your house.

If you aren't sure if you could benefit from the information and tips included in this guide, this test will make up your mind (Energy Neighbourhoods Project, 2013).[1]

1. *Energy Neighbourhoods 2 Project*. Funded by: Intelligent Energy Europe, Sustainable Living Wales, South Gloucestershire Council, and Cotswold District Council. 2013. http://www.energyneighbourhoods.eu/en_uk/top-tips

TEST: Home Energy consumption depends on your habits

Insulation and ventilation	Yes	No
I ventilate the rooms by leaving the windows open all day long.	0	3
I close the door of heated rooms.	2	0
My roof is insulated.	3	0
I have an open chimney.	0	2
The windows are single glazed.	0	3
The windows and exterior doors allow draughts through.	0	2
At night, I always close shutters and blinds.	2	0
The curtains hang over the radiators or convectors.	0	2
Heating	**Yes**	**No**
My boiler is at least 15 years old.	0	3
The last time the boiler was cleaned and the is temperature set, was over a year ago.	0	2
The radiators have thermostatic valves (I can set each room's temperature)	2	0
There is a room thermostat.	2	0
The heating stays on during the night and/or when we are out	0	3
All rooms are heated regardless of their use	0	3
I regularly bleed the radiators.	2	0
I use electricity as main heating system.	0	3
Hot water	**Yes**	**No**
The hot water cylinder is insulated with a solid foam jacket.	3	0
I have a water- saving shower head.	3	0
I have (thermostatic) single handle mixer taps.	2	0
Cooking and electricity use	**Yes**	**No**
I leave my chargers plugged in even when they are not charging anything.	0	2
I leave appliances on stand-by (TV, DVD, stereo)	0	2
The ice layer in the freezer or freezer compartment is more than 2 mm thick.	0	2
I leave the lid on the pan while cooking.	2	0
I use energy saving light bulbs throughout the house.	3	0
I leave the computer on when I am on a break or not working for a longer period of time.	0	2
Total (Yes + No)		

My Score:

45-60 points

Energy saving EXPERT

Congratulations! You're an A+ student! You are leading a very energy efficient life, we don't need you to make lifestyle changes, but maybe someone in your family needs to pass the retake exam and with this guidebook you'll be the perfect teacher.

30-44 points

Energy saving LEARNER

Come on… a little more effort and you will get your prize: a fuller wallet! You may be aware of some energy saving practices but they are not necessarily something you have integrated into your everyday life. Try to implement our tips and you will be amazed with the results.

0-29 points

Energy saving NOVICE

Ok. You really earned some corner time. But, trust us, if you read this guide, no one has to know. Energy saving is new to you!

Are you ready to improve your score by reading this guide?

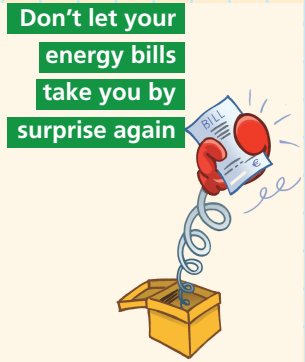
We bet you are!

But first of all, do you know...

What are you paying for in your bills?

Electricity and natural gas bill

The energy bill includes several elements that you should be aware of. The total amount of your bill combines the following items:



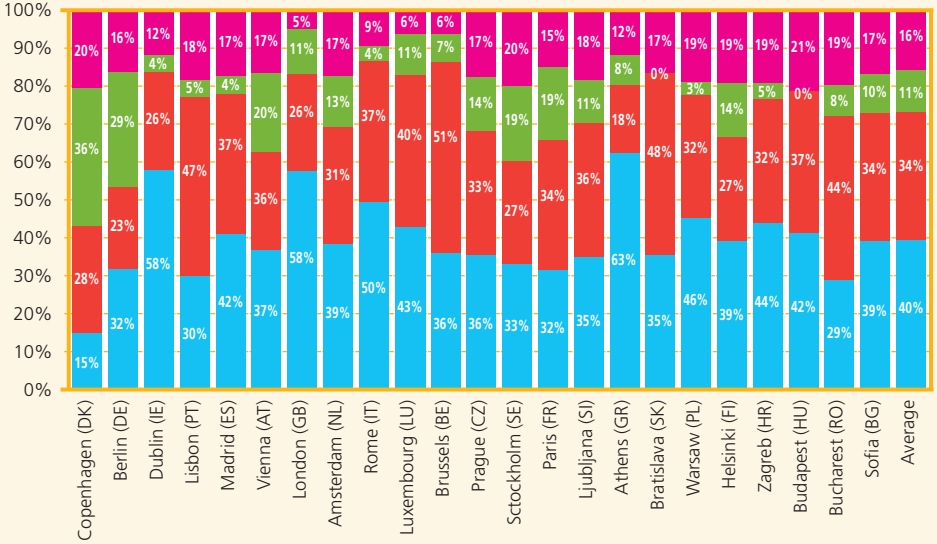
- **Fixed term:** Fixed charge you must pay to your energy company even if you don't use energy at all or you really push the boat out for Christmas. Actually, you're paying for the availability to have the contracted power anytime you need to. In each country they may include different elements, such as, for example: distribution costs for the building, maintenance and operating of the installations that transport and distribute electricity to your home. In your gas bill, it is a fixed term that depends on the tariff you contracted.
- **Energy consumption:** kWh consumed during the billing period.
- **Other charges related to certain provided services,** like the renting and maintenance of energy meters equipment.
- **V.A.T and other specific taxes** according to the national legislation.

Find out who is also paying your bills… The environment!

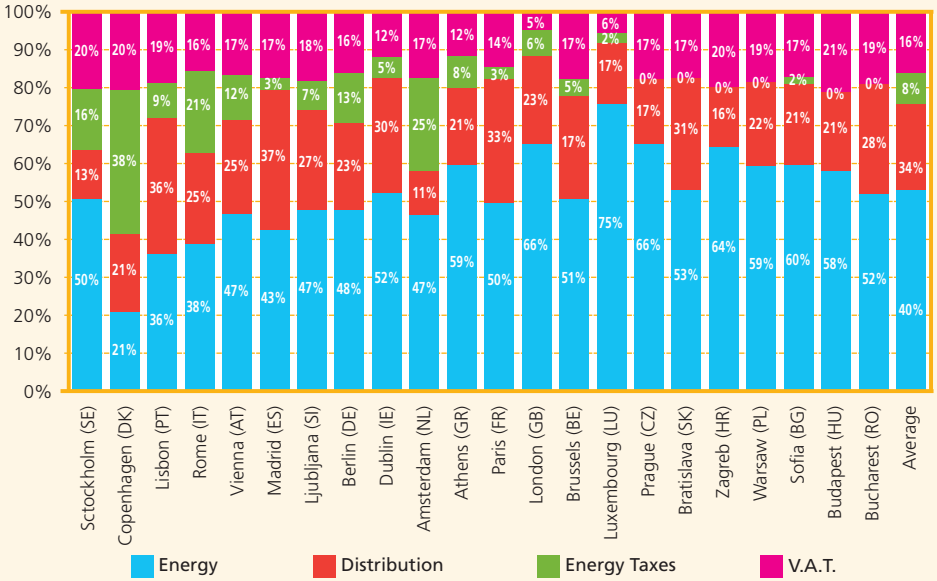
Energy source	Carbon emission
1 kWh of electricity generated by combined cycle	0.41
1 kWh of electricity generated by renewable energy	Negligible
1 kWh of electricity generated by nuclear power	Negligible
1 kWh of electricity generated by coal	1.09
1 kWh of electricity on average	0.44
1 kWh of useful heat produced by natural gas	0.24
1 kWh of useful heat produced by heating oil	0.36
1 kWh of useful heat produced by biomass	Negligible

The share of the total amount that each element represents, differs in every country.

Residential electricity price breakdown (July 2014)



Residential gas price breakdown (July 2014)



Source: *Household Energy Price Index for Europe*. Energie-Control Austria, MEKH and VaasaETT Ltd., 2014.

Tips to save energy

Consumption

What can you do?	Keep track of your consumption.
How?	Check your consumption and your bills regularly: it will ease the planning of your family budget. Witness how changes in your behaviour may affect energy bills.
How much can you save?	

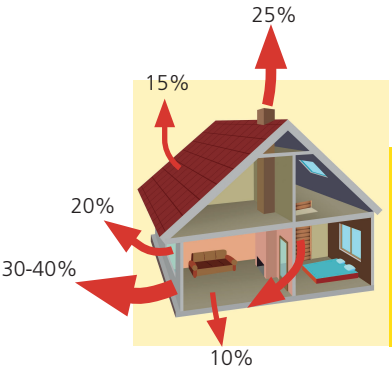
Reduce electricity cost

What can you do?	Check your electricity bill: does contracted power meet your needs?
How?	Have you ever experienced a power disconnection while several appliances were running at the same time? If your answer is no, maybe you are paying for an availability of power you don't really need. Use the FIESTA Tool to find out if you can lower your contracted power fixed term.
How much can you save?	
Payback	

Keep track of your appliances consumption, even on social network

Savings	Payback period (when you will get your benefits)
Some savings	Very short term
Little savings	Short term
Important savings	Medium term
High savings	Medium long term
Very high savings	Long term

Reduce heat losses in winter

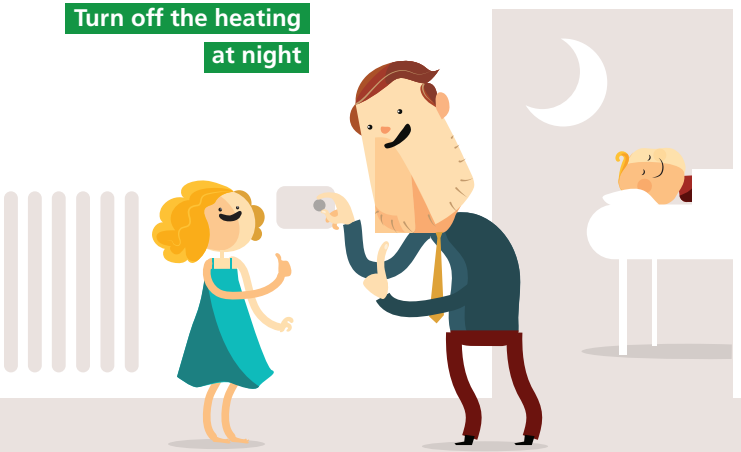


Did you know...?

Most of home energy losses are due to building features (facade, floor, roof, doors and windows).

What can you do?	Use blinds and shutters to save energy.
How?	They are the walls protecting your comfort and keeping the heat inside. They won't let anything in or out unless you give your permission. Keep them closed at night.
How much can you save?	

Turn off the heating at night



What can you do?	Stop heat losses through the chimney.
How?	Close the fireplace damper when you're not using it. You'll prevent heat loss up the chimney and cold draughts.
How much can you save?	

What can you do?	Improve the use of solar greenhouses.
How?	In winter, solar greenhouses and sunrooms should be kept closed while interior doors open. This way, you can capture heat and let it in your home. In summer, do exactly the opposite to keep the heat out of your home.
How much can you save?	

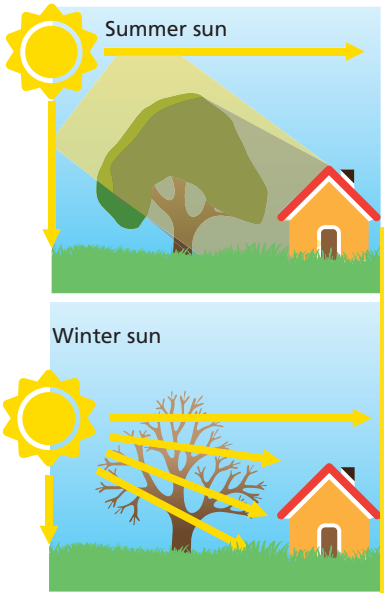
What can you do?	Remember to ventilate.
How?	Ventilation is needed to get fresh air in and let moisture and smells out. Open the windows daily. Please remember, the shorter, the better: 10 minutes are generally enough! In winter do that during the least cold hours and turn the heating on only when ventilation is finished.
How much can you save?	

What can you do?	Watch out for air and water infiltration through doors and windows.
How?	Cover cracks with cheap material as silicone, filler or draught excluders.
How much can you save?	
Payback	

What can you do?	Insulate your façade and roof.
How?	Choose external wall insulation solutions to gain the best results. Otherwise, opt for interior wall insulation or other insulating technologies.
How much can you save?	
Payback	

Avoiding excessive heat in summer

Most of the energy consumption in summer is due to an excessive heat generated during the day …



Did you know...?

Trees can help you save energy. They will not only grace your garden, but also help you reduce your bills. How? Plant deciduous trees close to the house to provide shadow (being careful of damages they could cause). East, South and West are the best locations.

What can you do?	Use blinds, shutters and awnings to keep heat away.
How?	Close shutters, blinds and curtains during the day and use awnings to protect windows from the sun. Wait for fresher hours to air out the rooms.
How much can you save?	

What can you do?	Protect your windows from excessive sun exposure.
How?	Install awnings.
How much can you save?	
Payback	

Did you know...?

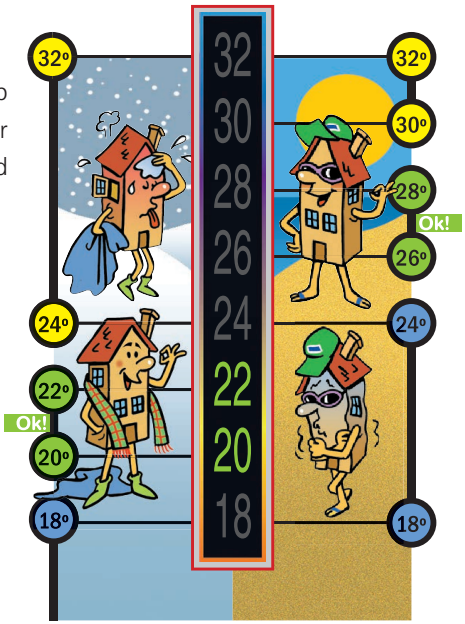
Leaving a window open for a prolonged time (11 hours) while the heating is on, wastes enough energy to drive a car from Paris to Charles de Gaulle airport and back.

Source: UNESCO.

What can you do?	Install high performance windows.
How?	Select the right window for your home. There are different types of high-performance windows and you can chose among: double or triple glazing, low-e coatings, low conductivity frame (e.g. wood frame or metal with thermal break), low U-value, appropriate solar gain coefficient (to maximize heat gains in winter, while avoiding glare and overheating in summer).
How much can you save?	
Payback	

Heating

The easiest way to save energy on heating is to keep the recommended indoor temperatures. In winter 21 °C during the day and 15 - 18 °C at night should be enough to make you feel comfortable at home.



What can you do?	Maintain your radiators properly,
How?	Check if all the parts of the radiator are warming up. In case some cool spots are found, you should bleed the radiator. Once you've done it, hot water will flow again. Do this once a year, preferably at the beginning of winter season. How to do it? Open the valve with a radiator key. As soon as air is out and water starts dripping, the radiator is ready. Finally, don't cover radiators with curtains and don't place any objects beneath them.
How much can you save?	

What can you do?	Keep heat where you need it.
How?	Take control of heated spaces by closing doors (or by opening them in case you want to let heat be distributed to other rooms). Leaving the door open in a single room you want to heat will make you waste energy and money.
How much can you save?	

Remember…

Dress wisely, using extra layers if necessary.

What can you do?	Install reflector panels between radiators and exterior walls.
How?	When radiators are installed on a poorly insulated wall, most part of the heat will dissipate through the wall and to the outside. To avoid heat losses a thin reflective panel between the wall and the radiator can be installed (they are easily available at stores).
How much can you save?	
Payback	

What can you do?	Try programmable thermostats.
How?	Thermostats will make things easier for you, enabling you to easily set "on" and "off" heating time periods. You could wake up in the morning to an already warm house, and go to bed without remembering to turn the heating off every day. If the house is empty for long periods during the day, you could set the thermostat in order to avoid energy consumption.
How much can you save?	
Payback	

What can you do?	Set the right temperature at home.
How?	Install thermostatic valves on radiators and digital thermostats to achieve the right comfort combined with low energy consumption. This way you will only use the exact amount of energy needed to keep the room at the expected temperature.
How much can you save?	
Payback	

What can you do?	Install high efficiency heat pump (A^{+++}) to replace conventional electric heating systems.
How?	Stoves and electric radiators can be replaced by heat pumps that can be used for cooling as well.
How much can you save?	
Payback	

What can you do?	Install energy efficient heating systems (A^{+++}).
How?	Unlike conventional boilers, low temperature heating systems reduce heat losses in distribution pipes. They are designed to regain more heat from burning fossil fuel, and particularly, from the produced water vapour. Moreover, if possible, install natural gas or biomass heating systems instead of oil ones.
How much can you save?	
Payback	

Cooling

The easiest way to save energy consumed by cooling devices is by keeping the recommended indoor temperatures: in summer 26 °C should be enough. Turning up your room thermostat by one degree, can lead you to a 8% saving. If you turn it up by two degrees, you can enjoy a whole day of free cooling, and avoid unnecessary colds.

What can you do?	Make sure air conditioning works at its highest performance,
How?	Clean the filters once a month and do preventive maintenance properly. Point adjustable flaps to the ceiling to slowly cool the rooms from the top. Splits must be placed in windows or walls near the center of the room and in the shadiest space of the house.
How much can you save?	

What can you do?	Take advantage on natural ventilation.
How?	Open north- and south-facing windows to facilitate cross ventilation, when it is cooler outside.
How much can you save?	

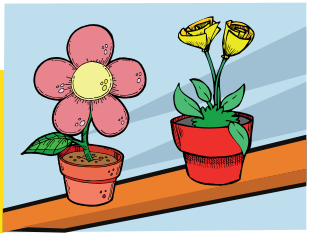
Use doors and windows to keep the cold in one space

What can you do?	Keep the cold in the space you choose.
How?	Take control of cold spaces by remembering to keep doors shut (or by opening them in case you want to let cool be distributed to other rooms). Leaving the door open in a single room you want to cool, will make you waste energy and money.
How much can you save?	

Did you know...?

In a controlled experiment conducted by NASA, plants remove 87% of toxins from polluted indoor air.

Source: UNESCO.



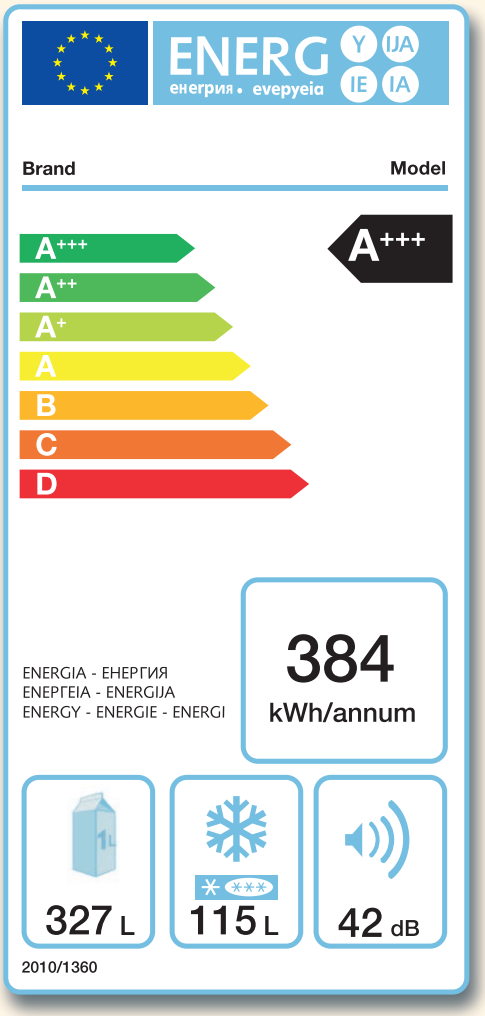
What can you do?	Give a try to evaporative cooling.
How?	If you live in a very dry climate, water can be your best ally. Evaporative cooling devices cool air through water evaporation, decreasing the indoor temperature by a couple of degrees. Plants will not only grace your house, but could contribute to evaportaive cooling as well!
How much can you save?	
Payback	

What can you do?	Whenever you can, prefer fans to air conditioning.
How?	Fans consume less energy and they can reduce thermal sensation between 3 °C to 5 °C.
How much can you save?	
Payback	

What can you do?	When buying a new cooling system, pay attention to its energy label.
How?	Choose a high energy efficiency system (A^{+++})
How much can you save?	
Payback	

Energy label infographic

Example: Fridge Energy label



Supplier's name or trademark and model

Energy rating

Annual energy consumption

Pictograms highlighting selected performances and characteristics

When you buy appliances, such air conditioners or light sources, you can really make a difference in energy efficiency – as well as in the reduction of your energy bills! Energy labels can help you compare the energy efficiency of the product you are going to buy and to estimate the cost of its use.

Domestic hot water

What can you do?	Set the right water temperature.
How?	A temperature between 35 °C and 40 °C should be enough.
How much can you save?	

What can you do?	Save hot water to save energy.
How?	Install water-saving shower heads and low-flow faucet aerators. Use single lever control (or thermostatic control) in sinks and showers to set the right temperature quickly.
How much can you save?	
Payback	

Turn off the tap:
you will not only save water

What can you do?	Make sure your pipes and water heater are well insulated.
How?	Check the thermal insulation of hot water pipes and tanks. Installing the missing insulation – or repairing it, if it is damaged – is a good investment.
How much can you save?	
Payback	

Lighting

Good lighting is essential to a healthy living. It should provide the perfect visual conditions for each room, guaranteeing high energy efficiency. It's demonstrated that lighting affects the mood and, combined with other elements, contributes to higher concentration and efficiency. The easiest way to save energy from lighting it's just by paying attention: turn off lights you don't really need and keep light bulbs always clean.

What can you do?	Use directional light sources.
How?	Flexible reading lamps are more efficient than ceiling lamps, which unnecessarily light the whole room.
How much can you save?	

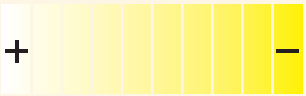
What can you do?	Make the most of natural lighting.
How?	Arrange furniture so to allow natural light in. Make sure windows and mirrors in strategic areas are kept clean.
How much can you save?	

Make the most of natural lighting

Lighting: units of measure

Kelvin

Measures the light temperature



When the light bulb has a high level, the light will tend to be white, whereas a low level will provide a yellow light

Lumens

Measure the light brightness

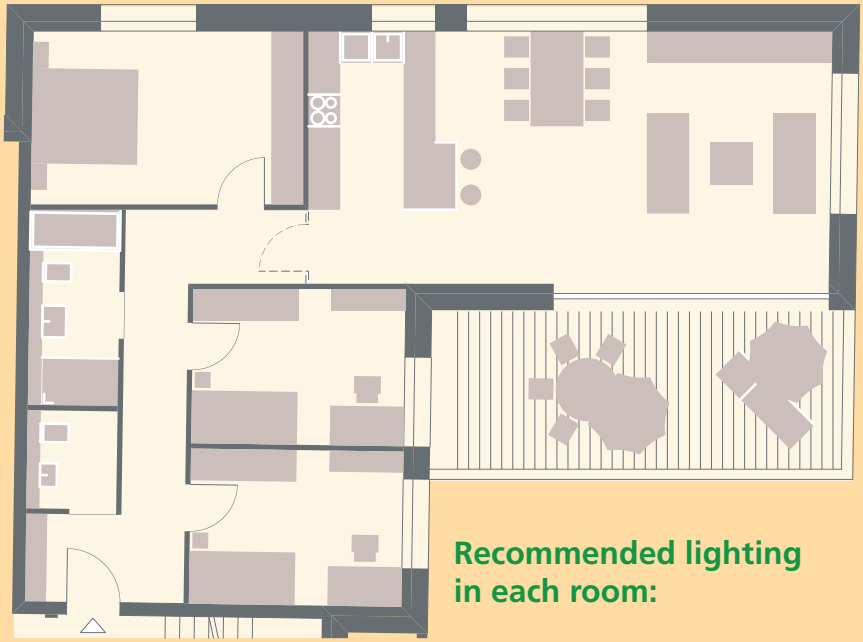
Wattage

Measure light energy consumption

Low consumption light bulbs will have lower wattage since they consume less electricity

Light bulb types

Luminous flux	You used to buy	You choices now		
	– efficient → + efficient			
	Incandescend	Halogens	Low consumption	LEDs
– bright	220 lumens	8 €/yr	5.7 €/yr	1.1 €/yr	0.7 €/yr
	450 lumens	11.5 €/yr	9.2 €/yr	2.1 €/yr	1.5 €/yr
	800 lumens	17.2 €/yr	14.9 €/yr	3.2 €/yr	2.3 €/yr
+ bright	1.100 lumens	23 €/yr	17.2 €/yr	4.4 €/yr	2.8 €/yr



Recommended lighting in each room:

- **Kitchen:** 200-300 lm/m². For a 10 m² kitchen you would need 2,000-3,000 lumens.
  Cooking area (cutting and preparing meals): 500 lm/m².
- **Bedrooms:**
  - *Adults:* 50-150 lm/m². For an 18 m² bedroom you would need 900-2,700 lumens.
    By the headboard, directional lighting is advised to allow people reading (up 500 lm/ m²).
  - *Kids:* 150 lm/m². For a 14 m² bedroom you would need 2,100 lumens.
    Kids' Play zone: 300 lm/m².
- **Living-room:** 100-300 lm/m². For a 25 m² living-room you would need 2,500-7,500 lumens.
  Watching TV: 50 lm/m².
  Reading: 500 lm/m² with directional light sources.
- **Bathroom:** 100 lm/m². For a 6 m² bathroom you would need 600 lumens.
  Mirror area: 500 lm/m².
- **Staircase, aisles…:** 100 lm/m². For an 8 m², staircase you would need 800 lumens.

Example:

A 6.5 W LED light bulb will provide 450 lm. A 40 W halogen light bulb will be needed to achieve the same lighting level.

Choose wisely...

Luminous flux	220 lm	450 lm	800 lm	1,100 lm	1,400 lm
Incandescend	35 W	50 W	75 W	100 W	140 W
Halogens	25 W	40 W	65 W	75 W	100 W
Low consumption	5 W	9 W	14 W	19 W	23 W
LED	3 W	6.5 W	10 W	12 W	17.5 W

What can you do?	Avoid using chandeliers and lamps with multiple light bulbs.
How?	Several light bulbs in just one lamp result in a lower performance than that of a single light bulb. For instance, six 25 W halogen light bulbs provide the same light as a single 100 W one, and need 50% more energy.
How much can you save?	

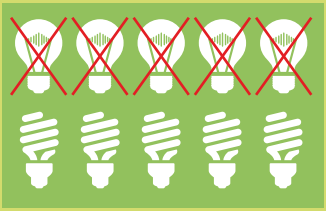
Did you know...?

Switching off a fluorescent light for one day would save 30 kg of CO_2. The equivalent of the CO_2 absorbed by 1.5 trees.

Source: UNESCO.

What can you do?	Choose the right light bulb.
How?	Replace incandescent or halogen light bulbs with low consumption or fluorescent ones. Moreover, if the light is to be switched on and off very often, it's better to avoid fluorescent lamps and choose instead LED ones.
How much can you save?	
Payback	

How can I help the environment?



If you replace 5 light bulbs with 5 low consumption ones, you will save 60 €/year and you will reduce 340 kg of greenhouse gas emissions. This equals to the amount of CO_2 that 34 trees on average can absorb every year.

Example: 450 lm luminous flux

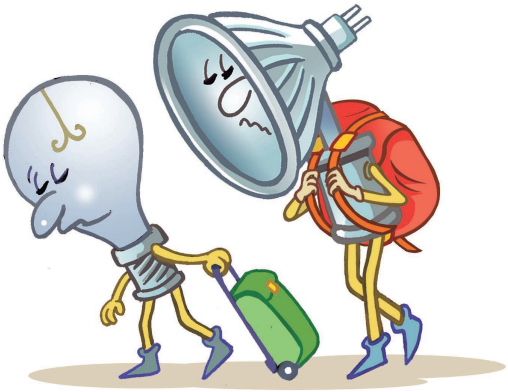
Light bulb	Luminous flux	Power	Lifespan (h)	Price (€)	Annual energy consumption*	Annual savings*
Halogen	450 lm	40 W	2,000	3.6	40 kWh 8.4 €	
Low consumption	450 lm	9 W	10,000	6.75	9 kWh 1.89 €	6.51 €

(*) Assuming 1,000 hours/year, including replacement costs and a price of 0.21 €/kWh.

What can you do?	Install switches that allow you to adjust lighting.
How?	Install a switch for every lamp. To be more comfortable, several switches for the same lamp can be installed in different places.
How much can you save?	
Payback	

What can you do?	Improve the lighting system.
How?	Whereas possible, adapt the lighting system to your real needs. Choose the right lamp for each room and the right lighting system according to the use of each space.
How much can you save?	
Payback	

The audience decided that incandescent and halogen light bulbs will leave the house



What can you do?	Replace the lighting system with LED lighting.
How?	It's recommended to install LED lighting in spaces that are used very often and for long periods (more than 5 hours a day). Otherwise other low consumption systems can be used.
How much can you save?	
Payback	

Appliances

Don't let your appliances drink your money!

Did you know...?

Changing your old appliances for new efficient ones, could lead to savings up to 800 € throughout their lifespan.

What can you do?	Choose the most efficient way to cook.
How?	Cooking with gas using standard pots is not very efficient (around 40%). To save energy, match carefully pot and burner. A large pot on a small burner is more efficient. Pressure cookers reduce cooking times, leading to at least 50% saving. Consider an induction cooktop: efficiency boost over to 80%. A microwave oven can be very efficient too.
How much can you save?	

What can you do?	Use your fridge/freezer properly.
How?	Place your fridge in a fresh and aired spot, keeping it away from heat sources. Clean the back at least once a year. Don't put hot food into the fridge/freezer. Make sure door selas are airtight. Defrost and clean before the ice layer is 2 mm thick. When defrosting food, do it using the fridge compartment in order to add extra cold to it. Keep the fridge at 6°C, the freezer at –18°C. Do not open the door too often and close it as soon as you are done. Make up your mind before opening the door.
How much can you save?	

What can you do?	Use properly your washer and dryer.
How?	Do a full load when possible. Select a low-temperature wash and save hot water only for particularly dirty clothes. Choose the spin cycle to remove excessive water before you put clothes in the dryer, it will help you cut yor energy costs. Hang your washing outside to dry in the sun whenever possible (also clothes will last longer). Remember to add limescale removal products and clean the washer filter regularly.
How much can you save?	

Did you know...?

Programming a 15 °C washer cycle instead of a 40 °C one reduces by 50% its energy consumption.

When using a washer, do a full load

What can you do?	Improve the use of your dishwasher.
How?	Make sure you wash full loads. You don't need to rinse dishes, just scrape off food and empty liquids. In case you really need to, use cold water. Clean the filter and check rinse-aid and salt deposits regularly. Use eneregy-saving cycles whenever you can. Look for the ECO programme in your dishwasher manual.
How much can you save?	

What can you do?	Make the most of your oven.
How?	Be patient and don't peek constantly into the oven, otherwise heat will dissipate. Make sure you use all the oven racks to cook several meals at once. Usually you won't need to pre-heat the oven to cook for longer than 1 hour. Turn it off before cooking has finished to make use of the residual heat. In winter, leave the oven door open when you finish cooking, it will warm up the kitchen too.
How much can you save?	

"Energy saving in your kitchen" recipe

- Before cooking, defrost meals in the fridge.
- Cut food into small pieces, cooking will be faster.
- Always cook several meals at a time, you will save energy and time.
- Use the right size of pans and pots, always wider than the heating surface.
- Check the bottom of pans and pots, and make sure they're totally flat, in order to get fully in touch with the hob.
- Remember, the more water you use, the more energy you will need to heat it.
- Use caps and lids while cooking, to avoid heat osses.
- When boiling is reached, turn the burner off: residual heat will finish off your cooking.
- Choose glass recipients for the oven. They keep heat better and meals cook faster.
- When you are cooking a meal you plan to freeze, you can turn it off before it is completely cooked. It will be finished when you defrost it.

How can I help the environment?

If every home appliance were A-class, power consumption would be reduced by 55% and 271 kg less of CO_2 would be emitted per year. This corresponds to the amount of carbon that is absorbed by 27 trees in a year's time. Refrigerators and freezers are the most power consuming appliances, that's the reason why it's essential to use and choose A^{+++} energy class products.

What can you do?	Get the best of your computer equipment.
How?	Turn off your PC when not in use and put it on the "sleep" mode for short breaks. Put your computer into "hibernate" mode to start automatically at 30 minutes of inactivity, it won't require you to reload your desk when you switch it back on. Regarding the computer screen, switch if off if you're taking pauses longer than 10 minutes. Adjust screen brightness to the level you actually need. If you have a printer, always print doubled- sided and use the "draft" (economic) mode.
How much can you save?	

Did you know...?

If you set your monitor's brightness level to mid-point, it will save up to 15-20% energy. If you set it to a low point, programmed in many laptops to start when battery runs out, it will save up to 40%. Always choose dark colours for the background.

Energy Star label is the official energy certification for low power consumption monitors, computers, operating systems, scanners, photocopiers and fax systems. Energy Star equipment has saving energy options that allow them to be in stand-by while not operating for a while. Devices in stand-by mode consume less energy resulting in important energy and economic savings.

We guess you never thought about …

Appliances energy consumption at home							
	Light bulb	20 W/h			Coffe maker	850 W/h	42.5 light bulbs
	TV	65 W/h	3.25 light bulbs		Microwave	1,000 W/h	50 light bulbs
	DVD	75 W/h	3.75 light bulbs		Dishwasher	1,100 W/h	55 light bulbs
	PC	75 W/h	3.75 light bulbs		Hair dryer	1,400 W/h	70 light bulbs
	Refrigerator	150 W/h	7.5 light bulbs		Vacuum cleaner	1,500 W/h	75 light bulbs
	Washer	395 W/h	19.75 light bulbs		Iron	1,600 W/h	80 light bulbs

What can you do?	Purchase more efficient computer equipment.
How?	When you buy new computer equipment, search for the Energy Star label, and prefer devices with A^{+++} energy class.
How much can you save?	
Payback	

Stand By

What can you do?	Avoid wasting energy that you do not use.
How?	Don't leave electronic devices on stand-by. Get used to switch them off completely.
How much can you save?	

Be careful!
Ghost consumption
may scare you!

What can you do?	Look for the easiest way to switch off appliances on "stand-by" mode.
How?	Use a multiple socket with a master switch to turn on and off all devices or an automatic standby shutdown, which is able to recognize when appliances are on stand-by.
How much can you save?	
Payback	

What can you do?	Buy high energy efficiency appliances.
How?	When looking for a new appliance, focus on its energy efficiency and prefer A^{+++} energy class devices.
How much can you save?	
Payback	

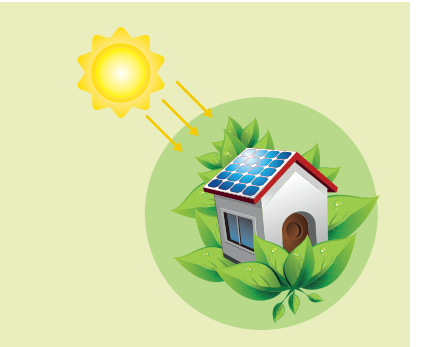
Ask your local Energy Help Desk

What can you do?	Ask for professional and free of charge support.
How?	Make an appointment with the Energy Help Desk and ask for a free of charge energy audit. The auditor will provide you with a tailor-made solution for your family. Moreover, your children will be delighted to become the home energy savers!
How much can you save?	

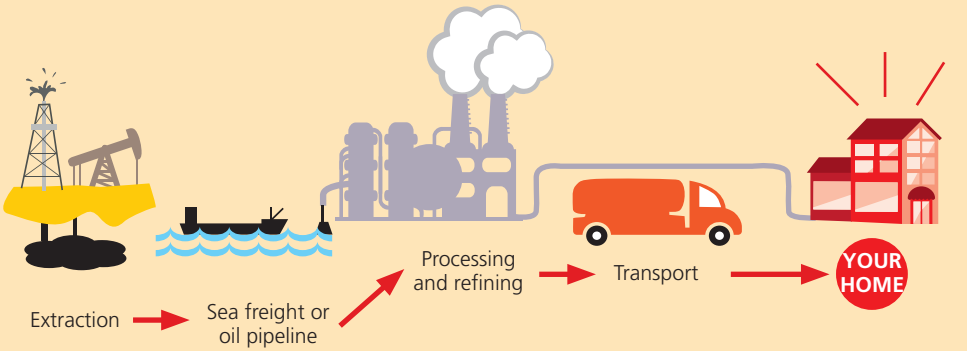
Tips to use renewable energy at home

Fossil fuels are running out, and their use is strongly impacting the world economy and global climate. Moreover, these resources threaten the environment (oil spills, water contanimation...) and human health. Fossil-fuel based diesel exhaust has indeed been related to increased respiratory diseases. The world won't hold on much longer if we keep our energy consumption at this level.

Therefore it's time to seriously reasses our consumption patterns and to give renewable energies a try. They can indeed provide a cleaner and cheaper energy generation system.



You choose how to heat your home...



Photovoltaic energy

Your roof can become a renewable power station by installing photovoltaic panels with batteries to store electricity. The price of these installations is similar to the conventional electricity costs. This energy source is suitable for blocks of flats, and single family detached houses.

Savings	Up to 100% of your electricity bill.
Installation cost	3,000 € - 10,000 €.

Thermal solar energy

Use the solar radiation to generate heat for domestic hot water and cooling. It can also contribute to rise the temperature in your radiators. In summer, by using solar absorption cooling systems, solar energy can be transformed in cooling. Although, not very affordable, this technology takes advantage on the production of the solar thermal generation during summer. This could be appropriate for blocks of flats, and single family detached houses.

Savings	Cut down domestic hot water consumption by 50-70%
Installation cost	3,000 € - 8,000 €.

Wind power

Microturbines are already powering homes, buildings, farms, and companies. Nevertheless, this technology needs space with high rates of wind. This could be ideal for single family detached houses.

Savings	It can represent 50-70% of the household energy consumption.
Installation cost	Still quite high.

Geothermal energy

Uses earth's constant temperature to heat and cool your home. The most popular geothermal system where space is limited, uses a vertical geothermal heat exchanger. That can be installed in holes ranging from 20 to 150 m. This may be a really good option for blocks of flats, district heating and single family detached houses. Its exploitation will only be feasible in areas with enough geothermal resources.

Savings	Up to 75% of heating, cooling and domestic hot water.
Installation cost	10,000 € - 12,000 €.

Biomass heating system

Firewood, wood pellet and wood chips are the most common biomass fuels used in buildings. In the medium and long term they are a really competitive heat source, compared to most fossil fuels such as natural gas. Their price to some extent is independent from increases in fossil fuel prices.

Although biomass heating systems often have a higher purchase price than fossil fuelled alternatives, the payback period for a wood fuel installation is often shorter as its running costs are lower.

The whole process of growing biomass and burning it to produce heat is "carbon neutral". In fact, trees absorb carbon dioxide during photosynthesis and store it in the wood for the life of the tree. When the wood is burned in a stove, the same amount of carbon dioxide is released back in the atmosphere.

During this process more CO_2 is released to the atmosphere, but the quantity is negligible. The 'embedded' carbon in woodchip is very small indeed, and in wood pellets is relatively low, although more than in woodchip.

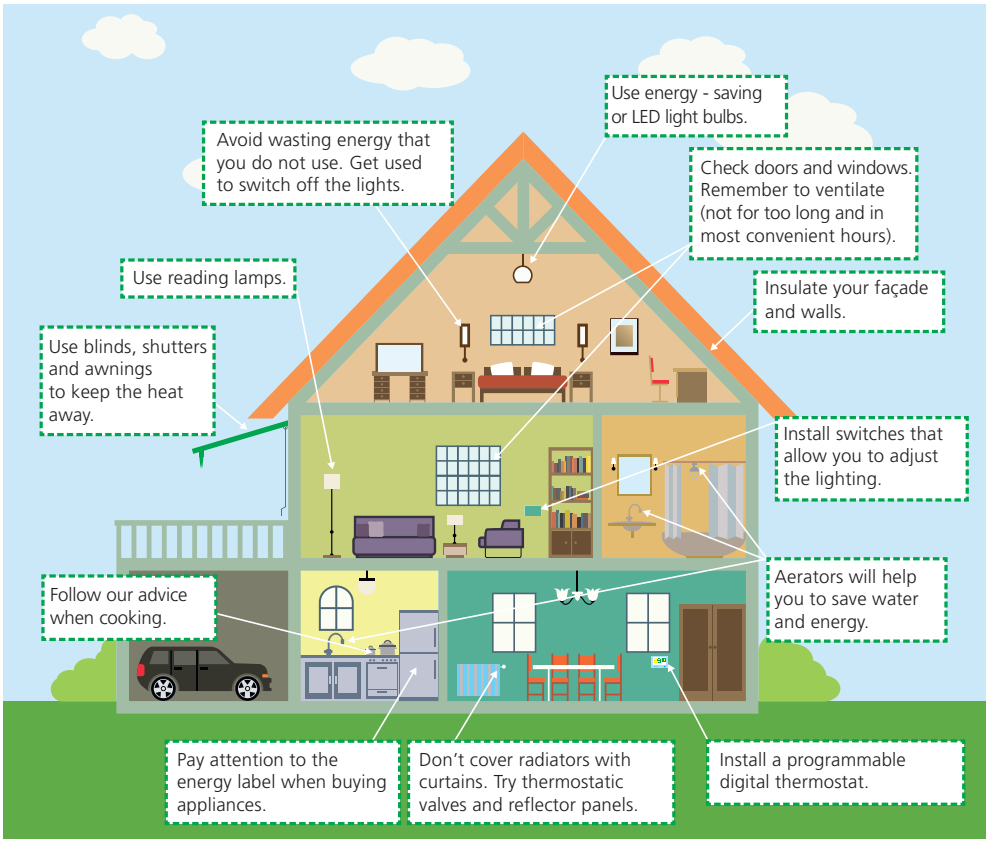
Some cities and countries might limit the use of biomass and/or set high requirements on the stove efficiency and filters, to prevent particulate emissions – typical of obsolete or inefficient wood stoves.

Concerns have been raised about biomass sustainability – including harvesting techniques, transportation and ashes disposal – and about adverse effect on air quality, particularly in densely populated urban areas, where particulate emissions (PM10 and PM2.5) are a compelling issue.

There are biomass stoves and biomass boilers, the only difference is the way they distribute heat. Biomass boilers heat the whole house by hot water distribution, whereas biomass stoves do it by convection (moving hot air). Both of them are reliable and affordable and a real competitor to natural gas.

Savings	40-60% in energy bills for heating and domestic hot water.
Installation cost	200 € - 800 € (stoves) and 2,500 € - 6,000 € (furnaces).

To sum up



	Tip	Cost	Savings	Page
	You just need to try			
	Keep track of your consumption	-	€€€€€	10
	Use blind and shutters to save energy	-	€€€€€	11
	Stop heat loss through the chimney	-	€€€€€	12
	Improve the use of solar greenhouses	-	€€€€€	12
	Remember to ventilate	-	€€€€€	12
	Use blinds, shutters and awnings to keep the heat away	-	€€€€€	13

	Tip	Cost	Savings	Page
	Maintain your radiators properly	-	€€€€€	15
	Keep heat where you need it	-	€€€€€	15
	Make sure air conditioning works at its top performance	-	€€€€€	17
	Take advantage on natural ventilation	-	€€€€€	17
	Keep cold in the space you choose	-	€€€€€	18
	Set the right water temperature	-	€€€€€	20
	Use directional light sources	-	€€€€€	21
	Avoid using chandeliers and lamps with multiples light bulbs	-	€€€€€	24
	Make the most of natural lighting	-	€€€€€	21
	Choose the most efficient way to cook	-	€€€€€	27
	Use your fridge/freezer properly	-	€€€€€	27
	Use your washer and dryer properly	-	€€€€€	27
	Improve the use of your dishwasher	-	€€€€€	27
	Make the most of your oven	-	€€€€€	27
	Get the best of your computer equipment	-	€€€€€	30
	Avoid wasting energy that you do not use	-	€€€€€	31
	Ask for professional and free help	-	€€€€€	32

Small investment

	Check your electricity bill: does contracted power meet your needs?	+++++	€€€€€	10
	Watch out for air and water infiltration through doors and windows	+++++	€€€€€	12
	Install reflector panels between radiators and external walls	+++++	€€€€€	15
	Try programmable thermostats	+++++	€€€€€	16
	Set the right temperature at home	++++++	€€€€€	16

	Tip	Cost	Savings	Page
	Give a try to evaporative cooling	++	€€	18
	Whenever you can, prefer fans to air conditioning	+	€€	18
	Save hot water to save energy	+	€	20
	Make sure your pipes and water heater are well insulated	+	€€	20
	Choose the right light bulb	++	€€	24
	Install switches that allow you to adjust lighting	+	€€	25
	Look for the easiest way to switch off appliances on "stand-by" mode	+	€	32

Investment to be considered

	Insulate your façade and roof	+++++	€€€€€	12
	Protect your windows from excessive sun exposure	++	€€	13
	Install windows and glazing with high insulation level	++++	€€€€€	14
	Install high efficiency heat pump (A^{+++}) to replace conventional electric heating systems	++++	€€€€€	16
	Install energy efficient heating systems (A^{+++})	+++	€€€€€	16
	When buying a new cooling system pay attention to the energy label	+++	€€€€	18
	Improve the lighting system	+++	€€€	25
	Replace the existing lighting system with LED lighting	++++	€€€	26
	Purchase more efficient computer equipment	++++	€€€€	31
	Buy high energy efficiency appliances	++++	€€€€	32
	Photovoltaic energy	+++++	€€€€€	34
	Thermal solar energy	+++++	€€€€€	34
	Wind power	+++++	€€€€€	35
	Geothermal energy	+++++	€€€€€	35
	Biomass heating system	+++++	€€€€€	36

What are energy audits?

What is an energy audit?

An energy audit is the first step to save money by making your home more efficient. The energy auditor will assess how much energy your home consumes and find out potential energy savings. The auditor will check the outside of the building first and then/she will visit your home room by room, testing your family energy habits which is a key aspect of energy consumption. Two neighbours with similar apartments and same installations, could have very different energy bills due to this fact.

What kind of information will the auditor ask you?

Indoor temperature in winter and summer, how many hours a day do heating/cooling system operate, how you use your appliances…

Your answers will help the auditor to identify simple ways to start saving money. Walk with the auditor through your home and ask as many questions as you need to understand how to save and improve your comfort.

To sum up, the energy audit will analyze your:

- **Building.**
- **Installations.**
- **Energy consumption.**
- **Family characteristics and habits.**

How can I get an energy audit for my home?

You only have to ask to your Energy Help Desk for an energy audit.

http://www.fiesta-audit.eu/en/services

What do I have to do?

Before the audit, make a list of every single issue you wish to share with the auditor.

Collect your las year energy and fuel bills. The auditor will go through them and will select the that could be more useful for your family.

Keep your usual routines while the auditor is around, so/she will understand the tips you need to know to start saving money.

Will the auditor help me to implement the tips?

Once you realize how to save money at home, you´ll need to implement all the tips you have just learnt, the auditor will answer all your questions and will come back to you after a few months, to check if you are really saving energy and money.

This is your chance to get on board with responsible consumption. Just remember to:

- **Consume according to you real needs.**
- **Protect the environment.**
- **Invest in your home energy efficiency.**

Learning about energy

Energy

Energy is the capability to perform work, to cause changes in the physical world (it can make a car run, but it can also make your fridge work). It is measured in kilowatt-hour (kWh) or Joules (J).

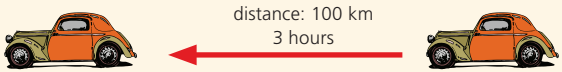
Power

Power is the capability of doing work in an unit of time. It's the electric current capability of doing work in a certain amount of time and its standard metric unit is the watt. Power is the rate at which work is done. Power is measured in kW.

The work done by these two cars is very similar (they are carrying two people through a distance of 100 km). But the power of a modern car is greater than the old models: it can travel the same distance in a third of the time required by the old car.

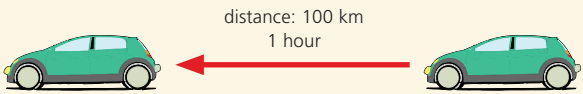
Old car

weight: 1,000 kg
distance: 100 km



Modern car

weight: 1,000 kg
distance: 100 km



Electric energy production and consumption

Example: the unit of measure of electricity is the Kilowatt hour (kW).

Button cell	0.001 kW
High Speed Train	8,000 kW

The amount of energy or useful work that an electric current provides, is usually measured in thousands of watts (kW) per hour (kWh). So, 1 kWh, is the work done in an hour by a 1 kW machine that works at its 100% performance.

The electricity bill is as well measured in kWh: the average annual energy consumption of a family in Europe is 17,800 kWh (of which 4,450 kWh correspond to the electricity consumption). The electricity average price for an European family is of 0.20 €/kWh, therefore the average yearly bill for a family is 4,450 kWh x 0.20 €/kWh = 890 €.

Usually we calculate the amount of energy consumption taking into account the time certain power (a 15 kW equipment) has been working. We can say, kW per hour, and even better kilowatt hour (kWh).

A hair dryer has an average power of (1,800 W) 1.8 KWh. If it works for an hour everyday (365 hours a year), at the end of the year its energy consumption will be 657 KWh, because a hair dryer normally works at 100% of its performance, which is not a characteristic common to all equipment (for example a TV, since we can set different levels of brightness, volume, or color).

To sum up:

1 kWh is the work done by 1 kW during 1 hour

1 kWh = 1,000 watts per hour

1 kWh = 3.6 x 10^6 J

1 kWh = 860 kcal

On average, the price of 1 kWh in Europe in 2014 was 0.2047 € per kWh.*

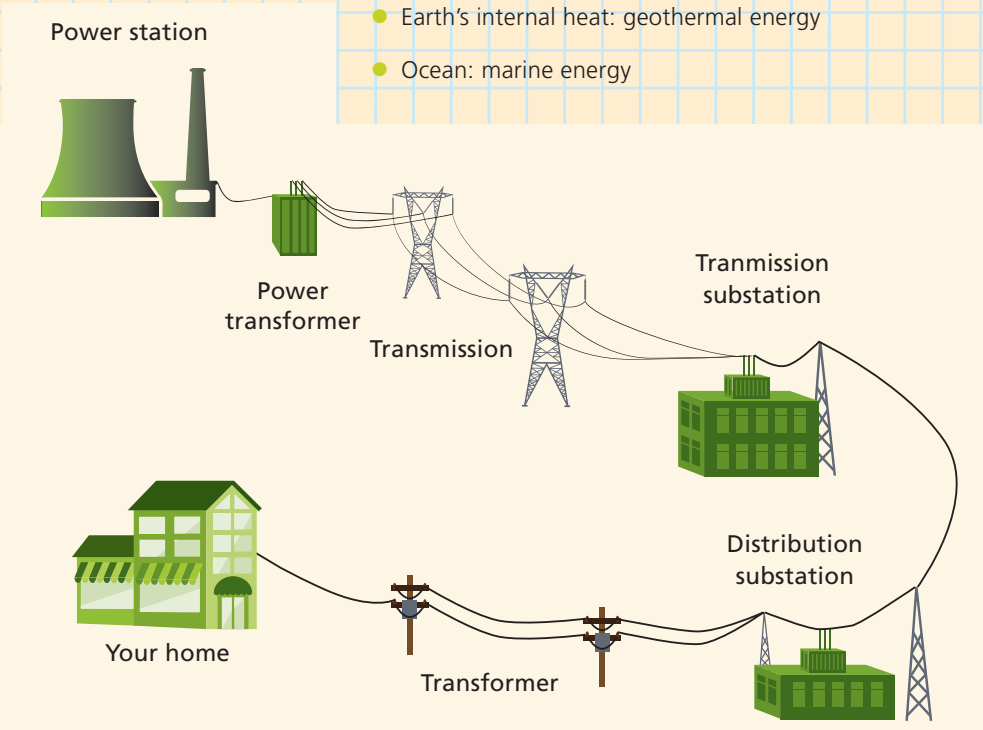
(*) Average national price in euro per kWh including taxes and levies applicable for the first semester of each year for medium size household consumers. Eurostat, 2014.

The energy journey

Electricity

Electric generation is possible thanks to a system which is able to transform primary energy into electricity. This electric energy is generated through:

- Water: hydraulic power
- Wind: wind power
- Uranium: nuclear energy
- Coal, oil, gas and biomass: thermoelectric power
- Sun: thermal solar energy and photovoltaic energy
- Cogeneration: It allows electricity and heat production.
- Earth's internal heat: geothermal energy
- Ocean: marine energy



Does electricity get on well with environment?

Carbon dioxide emissions in electricity generation are different in each country, since they are related to the country energy mix.

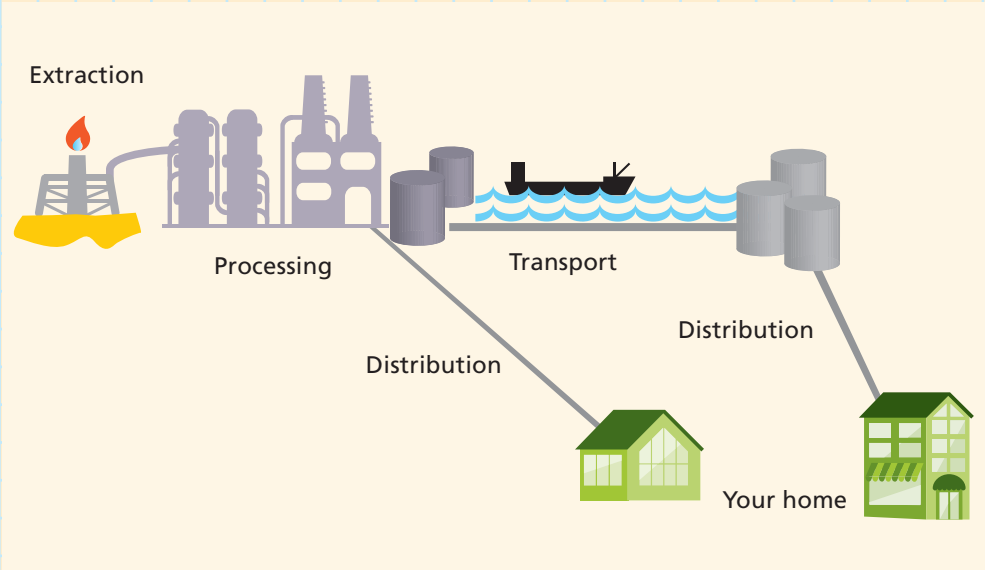
Energy mix: each country uses different shares of the available energy sources.

Is the mix always the same? No. It also depends on many other factors such as meteorology (a year with barely windy days, will have very low wind power production) or political decisions (to extent energy subsidies for nuclear energy), that can change every year.

Natural gas:

Natural gas is a result of the decomposition of organic matter through thousands of years.

In most cases, it can be extracted from wells and deposits (very often, along with oil). In addition, natural gas production can also be the result of bacterial fermentation of matter and organic waste – in such case it's called biogas.

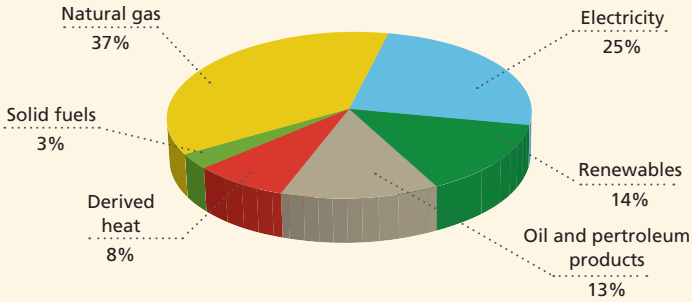


Energy in Europe

Generation

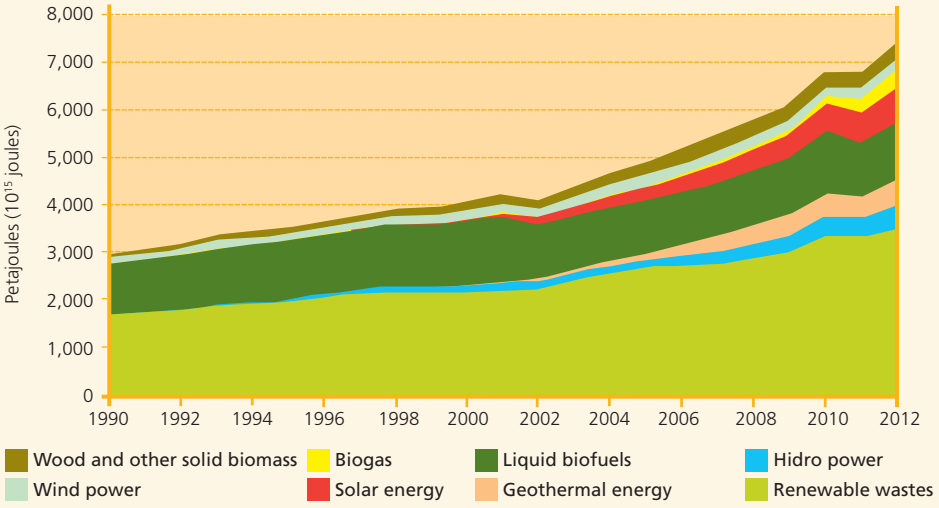
Do you know where energy comes from? Energy can be obtained from different sources available in nature and depending on which one you choose you will be helping or harming the planet. It's up to you.

Current situation: energy use in the residential sector by fuel



Source: Eurostat, 2014.

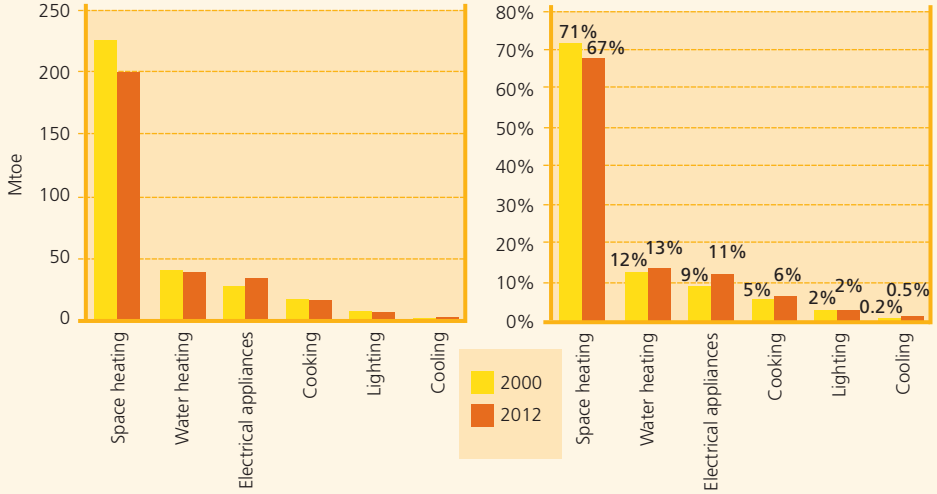
Is your energy renewable?



Source: Eurostat, Renewables primary production, 2012.

Consumption

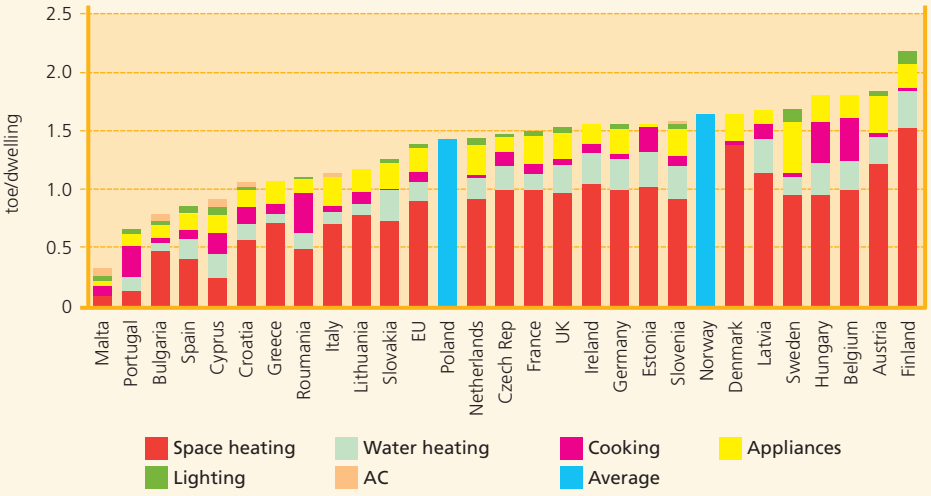
Household energy consumption in the EU



Source: Odyssee-Mure Project, 2014, IEE Programme.

Families' energy consumption is different in every country:

Household energy consumption by end-use



Source: Odyssee-Mure Project, 2014, IEE Programme.

Let FIESTA project help you.

Contact your local Energy Help Desk.

FIESTA
energy efficiency guide

http://www.fiesta-audit.eu

Co-funded by the Intelligent Energy Europe
Programme of the European Union