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**A Consumer Guide to Sustainable Energy**



*Sustainable Energy Ireland is funded by the Irish government under the National Development Plan 2000-2006 with programmes part financed by the European Union.*

# HOW TO MAKE YOUR HOME MORE **ENERGY EFFICIENT**



SEI, Glasnevin, Dublin 9

**tel:** +353 1 836 9080

**fax:** +353 1 837 2848

**www.sei.ie**

**info@sei.ie**

**SEI InfoLine**

8 to 8, Mon to Fri, 1850-376 666



## The energy for life...

Energy is essential to our daily lives. It heats our homes, fuels our transport and supplies our electricity. At the moment, most of the energy we use comes from fossil fuels such as oil, gas, coal and peat. Unfortunately there is a limited supply of fossil fuels in the world and we are using them up at a very fast rate. The other downside to fossil fuels is that burning them for energy also produces CO<sub>2</sub>, a greenhouse gas, which causes climate change. That's where sustainable energy comes in.

## So what is sustainable energy?

Sustainable energy refers to a way we can generate and use energy that is more efficient and less harmful to the environment. Another way of explaining sustainable energy is that it will allow us to meet our present energy needs without compromising the ability of future generations to meet their own needs. We can do this by being more efficient in how we use energy in our daily lives and also by increasing the amount of energy that we get from renewable sources such as the wind, the sun, rivers and oceans.

## What are the benefits of sustainable energy?

The good news is that being sustainable in how you use energy has immediate benefits:

- It will save you money on your electricity and heating bills
- Your home will be more comfortable and convenient
- And you will also be making a vital contribution to reducing climate change

Believe it or not, the small actions you take to be more energy efficient in your home can have a very significant impact on improving the environment. The collective efforts of individuals can often be the most powerful of all.

## Who is Sustainable Energy Ireland?

Sustainable Energy Ireland (SEI) was set up by the government in 2002 as Ireland's national energy agency with a mission to promote and assist the development of sustainable energy. SEI's activities can be divided into two main areas:

- **Energy Use** - Energy is vital to how we live our daily lives but most of us don't use energy as efficiently as we could. By assisting those who use energy (mainly industry, businesses and householders), to be more energy efficient, SEI can help to reduce the amount of energy we use overall.
- **Renewable Energy** - Energy that is generated from renewable sources such as wind and solar power is clean and doesn't produce harmful greenhouse gases. By promoting the development and wider use of renewable energy in Ireland SEI can help to further benefit the environment, in particular reducing the threat of climate change.

SEI is also involved in other activities such as stimulating research and development, advising on energy policy and publishing energy statistics.

Sustainable Energy Ireland is funded by the National Development Plan 2000-2006 with programmes part financed by the European Union.



### Did you know...

- **Energy use is responsible for two-thirds of Ireland's greenhouse gas emissions.**
- **Irish homes use around a quarter of all energy used in the country- that's even more than industry.**
- **The average home consumes almost 40% more electricity than it did in 1990.**
- **Renewable energy currently accounts for just 2% of Ireland's energy supply.**

## Home Energy Survey

The home is one of the largest users of energy in Ireland. It accounts for almost one third of the energy used in the country. Although energy is vital in our everyday lives, there are ways we can reduce the amount we use. This leaflet provides some practical advice on improving the energy efficiency of your home.

## The Home Energy Survey

This "Home Energy Survey" will walk you through your house, room-by-room, identifying home improvement projects that will deliver the greatest energy savings and reduce your bills most effectively.

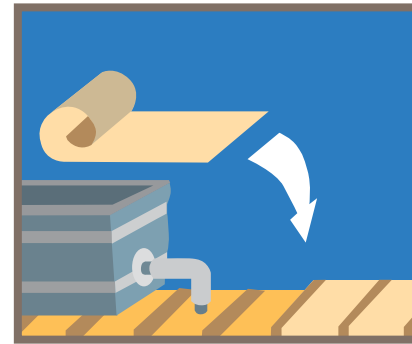
Often there will be more than one recommendation, so compare the "pay-back period" of each option. In other words how long it takes to recoup your initial outlay. First it makes sense to complete the projects that quickly pay for themselves. But remember that other projects, which pay for themselves more slowly, might have non-monetary advantages such as increased comfort, security, and noise reduction.

The most rewarding way to conduct the Home Energy Survey is to examine each area of your home, as shown in the following pages. The exact payback period for particular projects will vary depending on the age, type and style of your house, so we have provided indicative cost (€) and payback ratings (★). The outlined recommendations can easily be modified to suit any home.

There is also an 'Energy Saving Measure by Cost' summary at the back of this brochure, covering zero-cost, low-cost, medium cost and long term measures that are available to you.

Capital Cost Rating System
Approx Capital Cost
0 – Nil
€ – €1-€40
€€ – €40-€200
€€€ – €200+

Pay Back Periods Rating System	
Rating	Description
★★★★	Typical Pay-Back in less than 6 months
★★★	Typical Pay-Back in less than 1 year
★★	Typical Pay-Back in less than 3 years
★	Typical Pay-Back in less than 5 years



### 1 Attic

Without adequate attic insulation you are losing energy and money through your roof.

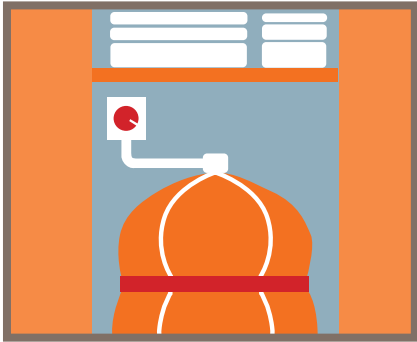
- If your attic insulation is currently less than 250 mm, you should add further layers. There are a variety of suitable materials including mineral wool, rock wool, sheep's wool, polystyrene, cellulose fibre and multi-layered foil. The water tank and pipes should also be insulated to prevent freezing. The area under the cold water tank should not be insulated. (€€€ / ★★)
- Check the attic hatch or door for cold draughts and, if required, seal with draught proofing to prevent heat escaping. (€ / ★★★★★)



### 2 Bathroom

The bathroom is generally where the largest quantity of hot water is used so there are good opportunities for energy savings.

- A thermostatic mixing valve can be used to set the water at the same temperature, every time the shower is turned on. (€€ / ★★★★★)
- Consider fitting a spray tap. It delivers as little as a cup of water for every half a bucket that an ordinary tap delivers, but still allows you to wash in the same way. (€€ / ★★★★★)
- Taking a shower rather than a bath uses only a fifth of the energy. (0 / ★★★★★)
- Never leave hot water running unnecessarily. (0 / ★★★★★)
- Generate hot water only when it's required and store hot water efficiently. (0 / ★★★★★)



### 3 Hot Press

It is wasteful and ineffective to leave a hot water cylinder uninsulated just so as it can contribute to the home heating.

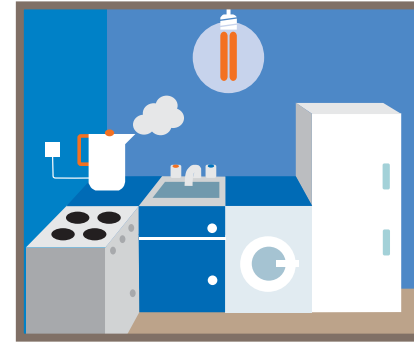
- The cylinder should always be lagged to minimise heat loss and keep the water hot for as long as possible. It is better still if the water cylinder has factory-applied insulation. (€ / ★★★★★)
- If your hot water is being heated by the central heating boiler, you should fit a cylinder thermostat to moderate the temperature. (€€ / ★★)



### 4 Bedrooms

Lighting levels in the bedrooms are generally lower than other parts of the house, and often only used intermittently. Heating control is important because, although unoccupied during the day, the room should be at a comfortable temperature by bedtime.

- Low wattage CFLs can be used to replace existing bulbs. (€ / ★★)
- Radiators in bedrooms should be turned off when the rooms are not in use. (0 / ★★★★★)
- A radiator thermostat can prove more efficient and more comfortable too, and can be used throughout the house. (€€ / ★★★★★)



### 5 Kitchen and Utility Rooms

The kitchen and utility rooms tend to be where most electricity is used. The lighting requirements are often at their highest in this area of the house and the large number of appliances typically consume the greatest energy.

- When purchasing a washer, dryer, \*fridge, freezer, dishwasher or oven, look for the energy label. Purchase A or B rated appliances where possible. (€€€ / Variable)
- Fluorescent tubes are considerably more energy efficient than traditional tungsten filament bulbs, particularly the newer slim 26 mm tubes. (€€ / ★★★★★)
- Where fluorescent tubes are not suitable install CFLs. (€ / ★★★★★)
- A thermostatic radiator valve on the kitchen radiator will allow the heat output to be varied on demand. (€€ / ★★)

- Energy can also be saved by using existing appliances correctly. For example:
  - i. Never under or overload appliances i.e. dishwashers, washing machines
  - ii. Lower temperature washes save energy
  - iii. Microwave ovens and pressure cookers use less energy than conventional ovens
  - iv. Use pots and pans that cover the whole of the cooker ring
  - v. Only fill the kettle with the water you need
  - vi. Use the toaster rather than the grill
  - vii. Keep fridges and freezers away from cookers/ovens and direct sunlight. Defrost regularly, to save energy and extend the operating life, and avoid putting hot or warm food directly in the fridge. (0 / ★★★★★)

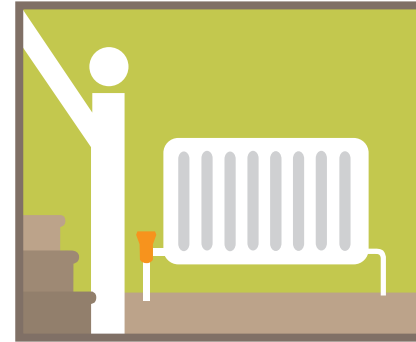
\* As of 31st December 2004 all fridges on display in shops must be labelled with a new energy rating: A++, A+, A, B, C, where A++ is the most efficient rating.



## 6 Living Room and Dining Room

Where possible adjust lighting in the living and dining rooms as appropriate. The level of heating required for these rooms is usually high compared to other areas of the house.

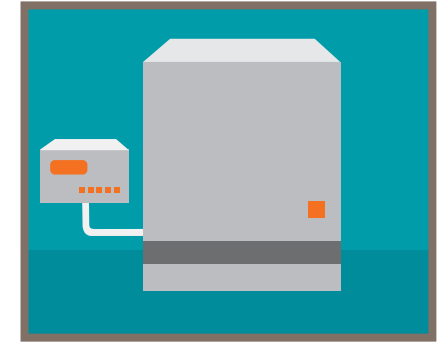
- Use CFLs or dimmer switches (though not together) to achieve appropriate lighting levels. (€ / ★★★)
- Unplug or turn off electrical equipment such as TVs, videos/DVDs, Hi-Fi and computers when not in use, as they use energy even when they are on 'standby'. In fact all lights and appliances should be switched off when not in use. (0 / ★★★★★)
- Thermostatic radiator valves keep rooms at a constant and comfortable temperature and are very effective in rooms with other heat sources, such as open fires. (€€ / ★★★)
- If required, choose occasional electric heaters that are fitted with a thermostatic control to maintain optimum comfort at minimum energy use. (€ / ★★★★★)
- An efficient heating system will provide significantly more heat than an open or fuel-effect fire, which lose up to 85% of their energy up the chimney. (€€ / ★★★★★)



## 7 Hall, Stairs and Landing

Lighting is generally left on for long periods and only background heating is required.

- This is an ideal location for CFLs to be installed. (0 / ★★★)
- If the radiator is already fitted with a thermostatic radiator valve, find the lowest setting that will provide a comfortable level of heating. (0 / ★★★★★)
- If there is no thermostatic radiator valve it is worth considering having one installed. (€€ / ★★)
- If your hall door or letterbox allow draughts in during winter, they should be draught-proofed. (€ / ★★★★★)



## 8 Boiler and Controls

- A time clock limits the running time of your heating system, thereby reducing wasteful use of energy. (€€ / ★★★)
- The thermostat, controlling the heat output from the boiler to the house, should be installed in an area that is indicative of the general heat conditions of the house. Remember, a reduction of 1°C on your thermostat can reduce annual space heating costs by 10%. (€€ / ★★)
- You should have your boiler professionally serviced at least once a year. (€€ / ★★★)
- If you have an old central heating control system it may be worth installing a new one. (€€ / ★★★)
- Optional Boiler Controls:
  - A weather compensation system regulates the heating system based on both indoor and outdoor temperatures. (€€€ / ★★)
  - An optimiser is an intelligent control that also reads indoor and outdoor temperatures. It then switches on the heating for the shortest possible time to provide the ideal level of comfort. (€€€ / ★★)



## 9 General

As well as room specific opportunities to reduce energy usage, here are some other general recommendations.

- All windows and external doors should be checked for draughts and, if necessary, draught proofed to reduce heat loss. Remember to leave adequate ventilation for fresh air particularly where there are fuel burning appliances in rooms.

(€ / ★★★★★)

- When replacing windows significant energy savings can be achieved if you choose double glazed units, particularly those with Argon fill and low-emissivity glass.

There will be added benefits too:

- The comfort will be greatly increased
- Cold draughts will be reduced
- External noise will be substantially reduced
- Condensation on windows will be either eliminated or greatly reduced

(€€€ / Variable)

- Always close your curtains to save heat. Lined curtains are better still.

- There are a number of ways in which wall insulation can be increased and improved. The payback period will depend on a number of factors including type, thickness and quality of existing insulation. The most popular types of insulation systems are, (i) insulated dry lining, (ii) blown mineral or cellulose fibre or polystyrene beads in the cavity, and (iii) rigid external insulation with render or brick finish. Specialist advice should be sought in all cases.

(€€€€ / Variable)

## Calculating your Energy Savings

By calculating exactly how much energy you're using at present, you can easily track the savings you make for each project you undertake. To do this, divide your energy usage into two separate categories: electrical energy and energy for heating.

### Calculating your Electrical Consumption and Costs

Collect your last six two-monthly ESB bills, covering a one-year period. Calculate your electrical energy use by subtracting the "Previous" reading on the first bill from the "Present" reading on the sixth bill. This gives you the total number of "units" of electricity used in the year. These units stand for kilowatt-hours (sometimes shortened to kWh), which are used for measuring energy use. To calculate your electrical energy costs multiply cost per kWh, or "unit", i.e. the tariff you pay, by the number of kWh used. This is the cost of your electricity. Add the two monthly standing charges x 6 and then the VAT to get the total cost of electricity.

### Calculating your Heating Energy Consumption and Costs

Calculating the amount of energy used for heating will vary depending on the type of fuel you use to heat your home. If you use natural gas or electricity the procedure is very similar to the one shown for electricity. The number of kWh, or "units", and costs are simply totalled for a one-year period and added to the standing charges and VAT.

The procedure for other fuels is also simple. List all the fuels that you use for heating - perhaps these include coal or oil - and estimate how much you use in a year. Now use the Energy Content of Fuels table below to convert the fuel amount purchased into energy consumed in kWh.

#### Energy Content of Fuel

Fuel	Unit of Supply	Factor Conversion
Electricity	1 unit =	1 kWh
Heating Oil	1 litre =	10.5 kWh
Natural Gas	1 therm =	29.3 kWh
LPG	1 litre =	6.9 kWh
Coal	1 tonne =	8,300 kWh
Anthracite	1 tonne =	8,800 kWh
Coalite	1 tonne =	8,400 kWh
Peat Briquettes	1 tonne =	5,400 kWh



Here's an example of how to calculate the energy consumption and costs for oil fired central heating:

Average for one year:	2600 litres of oil
Conversion Factor:	(From table) 1 litre = 10.56 kWh
Total Energy used :	$2600 \times 10.56 = 27,456$ kWh

Now add up the amount and cost of heating energy used across all fuels in the house for a one-year period.

## Calculating your House's Energy Rating and Cost Rating

Your house's "energy rating" is a figure that compares your annual energy usage to the internal floor area of your home. In other words, it measures your annual energy consumption per square metre of floor area in a particular year. It is quoted as kWh per m<sup>2</sup> per year.

To calculate your "energy rating", first estimate the approximate floor area of all the rooms in the house which are heated. Do not include garages or outhouses unless they are heated or have high electrical loads - perhaps a tumble dryer or washing machine.

The annual total number of kWh (or units) used for electricity and heating, calculated previously, are added together. This figure is then divided by the floor area. This will give you the energy rating for your home, for a particular year.

For example, a house of 120 m<sup>2</sup> area, which uses 7,002 kWh of electricity and 27,456 kWh of heating energy in a year, has an energy rating of 287 kWh / m<sup>2</sup> per year. Similarly, having spent €890 on electricity and €985\* on heating oil this home will have a cost rating of €15.61/ m<sup>2</sup>. If gas is the source of home heating an expenditure of €686\* will result in a lower cost rating of €13.45/m<sup>2</sup>.

The values you arrive at will depend on how many people occupy your home and your specific heating patterns. The same is true for the savings you will be able to make. For example, poorly insulated older houses will benefit substantially more from additional insulation than newer highly insulated ones.

But whatever type of house you live in, it should be possible to improve your home energy-rating year on year. For a more detailed calculation of your homes 'Heat Energy Rating' visit [www.sei.ie](http://www.sei.ie) ('Energy and You' section).

\*Costs are based on approximate energy prices at time of publication. Up to date energy prices are available from the SEI website at [www.sei.ie](http://www.sei.ie)

## Monitoring & Targeting

Set targets for your energy consumption and costs for the coming year. For example, if your energy rating is currently 287 kWh per m<sup>2</sup> per year, set yourself a target of 250 kWh per m<sup>2</sup> per year, next year. A similar target could also be set for the cost rating.

Once a particular project has been completed the information from your energy bills will highlight your success. Compare the energy used and related cost of the present period to the same period last year to see if there has been a significant reduction. At the end of the year, see whether you have reached or surpassed your targets.

By completing the Home Energy Survey, and/or pursuing your energy rating, monitoring and targeting, you will probably find that your home becomes more comfortable and more cost effective with each new project undertaken. You can be confident too that you will have reduced the emissions of harmful greenhouse gases from your home – benefiting your environment, your country and the world as a whole.

## Energy Saving Measures by Cost

To summarise the various costs involved in making your home more energy efficient, we have divided the numerous opportunities under four headings. Whatever your budget there are energy saving measures you can undertake.

### Zero- cost Energy Saving Measures

- Turn down thermostats
- Use timers for hot water or space heating
- Switch off lights/appliances when not in use
- Shower rather than bathe
- Close curtains at night
- Fix leaking taps
- Position fridges and freezers in a cool place away from direct sunlight and heat
- Always wash full loads in your washing machine and dishwasher
- Maintain your hot water boiler

### Low-cost Energy Saving Measures (up to €150)

These measures typically recoup their cost in 1-2 years

- Insulate your hot water cylinder
- Draught seal doors, windows and other gaps
- Improve heating and water controls
- Replace ordinary light bulbs with energy saving CFLs
- Use lined curtains

### Medium-cost Energy Saving Measures (€150-€450)

These measures typically recoup their cost in 3-4 years

- Insulate your attic
- Consider ground floor insulation options
- Central heating controls
- Buy energy efficient appliances

### Long-term Energy Saving Measures (>€450)

These measures are ideally considered when doing renovation/replacement work

- Cavity wall insulation
- Internal wall insulation
- External wall insulation
- Low-emissivity double-glazing
- Solar water heating systems

## Relevant Standards

Building Regulations, 2002  
Part L: Conservation of Fuel and Energy  
Part F: Ventilation  
Part J: Heat Producing Appliances

ISEN 832 - Thermal performance of buildings - calculation of energy use for building  
-residential buildings CEN 1998.

## Useful Contacts for Further Information

### For information on energy efficiency measures

SEI, Glasnevin, Dublin 9

### For information on solar technologies

Energy Research Group, UCD School of Architecture, Richview, Clonskeagh, Dublin 14.

Irish Solar Energy Association, 17 Kildare St., Dublin 2.

SEI, Renewable Energy Information Office, Shinagh House, Bandon, Co. Cork.

### For information on radon

Radiological Protection Institute of Ireland, 3 Clonskeagh Square, Dublin 14.

ENFO, 17 St. Andrew Street, Dublin 2.

### For information on insulation

Insulating Contractors Association, Construction Industry Federation,  
Federation House, Canal Road, Dublin 6.

### For information on building products standards

National Standards Authority of Ireland, Glasnevin, Dublin 9.

Irish Agrément Board, Glasnevin, Dublin 9.