

# Energy Audit

## About this project

This guide is for a **6 month Silver Award project**. It is suitable for both **group and individual** volunteering.



Through this project you'll help the National Energy Foundation to meet our aim of improving the use of energy in buildings while making a difference to the people and places around you.

## What does it involve?

An energy audit is an assessment of the energy needs and energy efficiency of a building. This project involves calculating the current use of gas and electricity and carrying out audits to assess the amount of energy used by lights, appliances, heating and hot water. You will then be able to look at your results to find ways to save energy and present your findings to the person who is in charge of energy.

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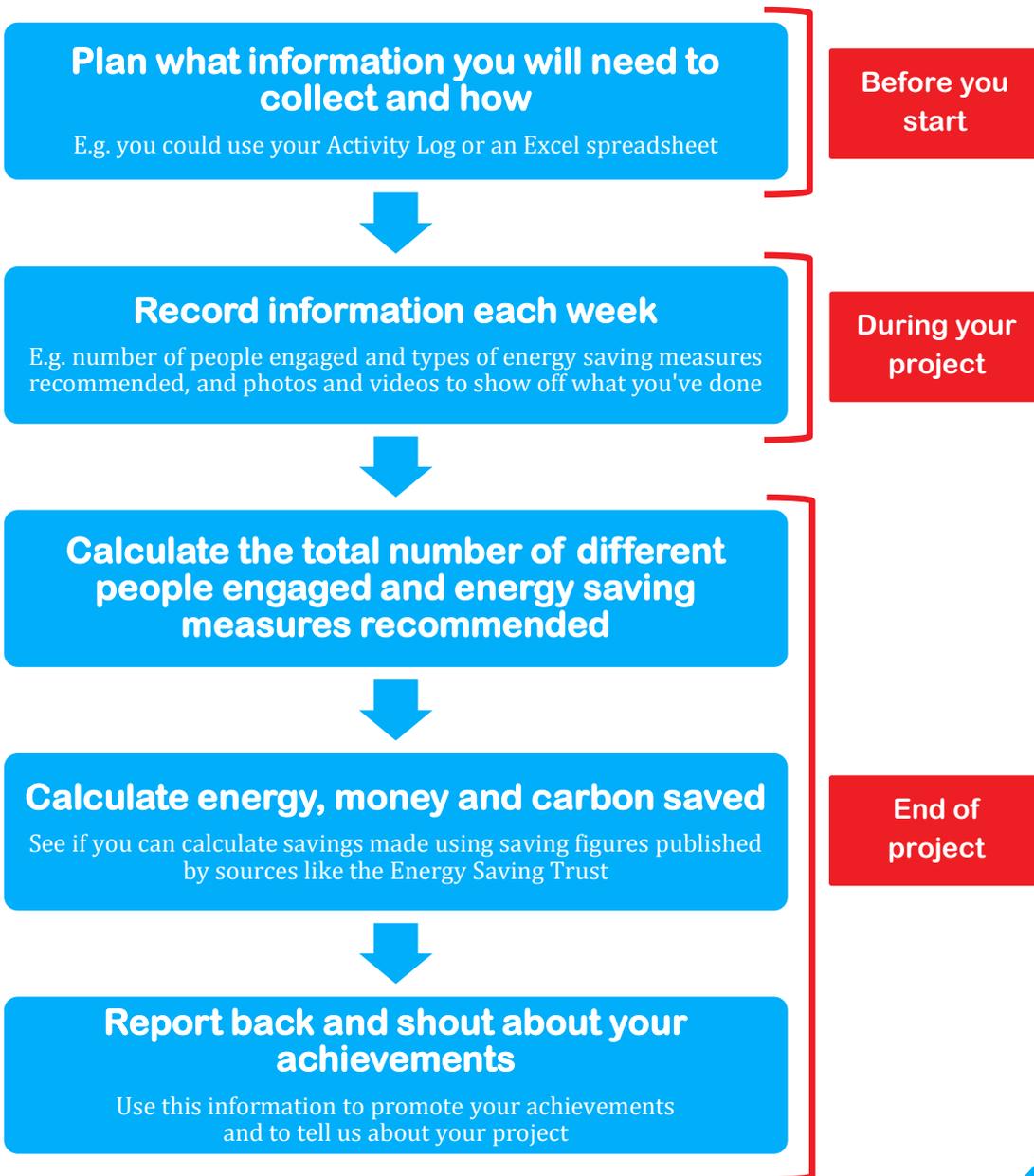


## How to use this guide

- Follow this step-by-step guide to plan, run and evaluate your very own energy saving project. You might take more or less time than is set out in the guide to complete a step – don't worry, this is your project so you can decide how you use the time available. If you have other ideas that aren't included in the guide, feel free to use them and adapt the guide to meet your own needs.
- Refer back to the [Energy Tutorial](#) to get ideas for energy saving tips you might need during your project.
- Make sure you keep safe. When your project involves activities outside of your home, you should carry out a risk assessment and ensure you have appropriate adult supervision if you're under 18. [Click here](#) to download tips and a template risk assessment form.
- At the end of each week, update your Activity Log to keep a record of what you've done and save any photos, videos or other materials you've produced. Download an Activity Log to fill in by [clicking here](#).
- When you finish your project, complete the [End of Project Survey](#) and send information about what you've done, along with your photos, videos and materials produced, to [energyenvoys@nef.org.uk](mailto:energyenvoys@nef.org.uk) to claim your Energy Envoy Certificate from the National Energy Foundation.
- Remember you must spend a minimum of **one hour per week** volunteering for the time required at your level for it to count towards your Bronze, Silver or Gold Award.

## Tracking your progress

At the end of your project you'll need to report the number of people you've engaged. This will include people given advice about energy, reached by social media, attending events and presentations, and engaged about energy in any other way! You may also be able to calculate the amount of energy, money and carbon saved through your project. Here's what you should do:



## Week 1-3



If you haven't already, make sure you've completed the three week [Energy Tutorial](#) first to get lots of ideas and tips that will help you with your energy saving project.

## Week 4



Start your project by thinking about which building you're going to audit. Discuss your ideas as a group or brainstorm on your own. The building could be your DoFE centre, your school, feeder primary school or college, a community hall or a local business (e.g. a local shop or café), but it can't be your own home (otherwise it won't count as volunteering to help your community!). You will need access to the electricity and gas bills for the last year for your project, so consider who you would have to contact to find out whether they will give you permission.

Compare your ideas by considering the pros and cons of each. Factors to think about might include:

- Location – how will you get there?
- Point of contact – who will you need to talk to?
- Access to energy bills – can you get this information?
- Access to the building – can you visit the building to conduct the audit?
- Help during the audit – can someone from the building (e.g. a caretaker) help you during the audit?
- Anything else?

By the end of the session you should have decided which building you're going to audit. Talk to the person in charge of the building about your project and make sure they are happy for you to complete the project there before the next step. Why not take a copy of this guide with you to explain the project to them? Remember to mention that the purpose of the project is to help them to identify ways they could save energy!

Don't forget to keep a record of what you've done, the number of people you've engaged and the different energy saving measures you recommend, and save any photos, videos or other materials you've produced.

## Week 5



Plan the tasks that need to be completed to carry out the lighting and electrical appliances audits. These audits will include the tasks below, but there might be other things you need to do to collect the energy bill data and to complete the audits.

- Collect electricity bill data for the last year (or three years if possible)
- Analyse the bill data to determine current electricity consumption
- Design audit forms for assessing lighting and appliances in the building (this will be a simple table to fill in)
- Visit the building to fill in the audit forms
- Assess the results of the audits and identify ways to save energy
- Anything else?

By the end of this week you should have agreed who is going to do what (if you're volunteering as part of a group), as well as planned and agreed a date and time for the audits.

If you're auditing a school, the best time to complete the audits is likely to be during a break time or lunch time when rooms are less busy. If you can, arrange for someone from the building (e.g. a caretaker) to complete the audit with you or to tell you which types of light bulbs and appliances are used in different rooms.

## Week 6



It's time to find out the actual electricity consumption of the building. Collect copies of the electricity bills for the building for the last year (or three years if possible). If your chosen building is a school, the school bursar should have this information.

Energy bills are measured in the amount of kWh (kilowatt hours) used. Energy used is measured in kilowatts (kW), so kWh is the amount of energy used over time. You need to find out the total kWh used per bill (mainly in quarterly bills) and costs for electricity. Write down these figures or record them in an Excel spreadsheet. How do the electricity costs compare between different quarters and years? Can you think of any reasons why this might be?

If you have time, convert the kWh to CO<sub>2</sub> emissions by multiplying kWh by 0.462 (this is the carbon 'conversion factor' for electricity) and record this in your notes or

spreadsheet. This provides a CO<sub>2</sub> kg equivalent (1 kg of CO<sub>2</sub> is the equivalent of the amount of air needed to fill 100 party balloons).

You now have the baseline energy figures for the building!

## Week 7



This week you're going to design a lighting audit form which you'll take with you to fill in during the audit. Your audit form needs to record the date and time of the audit, as well as the following for each room in the building that you're auditing:

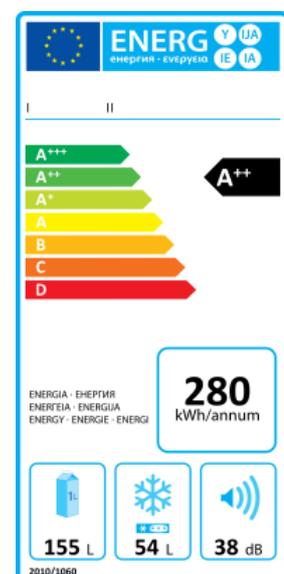
- Room number
- What the room is used for
- Is the room empty?
- Total number of light bulbs
- Number of light bulbs switched on
- Number of light bulbs switched off
- Types of light bulb (these vary greatly in size and wattage – the caretaker could help you to identify them)
- Wattage (all bulbs are rated by wattage (W), which is the amount of energy they use – the caretaker could help you to identify this)
- Light level of the room (if you can access a light meter)

## Week 8



Next, design an electrical appliances audit form. This form could include:

- Date and time of the audit
- Room number
- What the room is used for
- Is the room empty?
- Type of appliance (e.g. computer, printer, kettle, air conditioner, ...)
- Is the appliance switched on or off?
- Is the appliance on standby? There is usually a light to show if the appliance is on standby.
- Is there an energy rating on the appliance? If so, what is the rating? It will look like the diagram opposite. Refer back to the [Energy Tutorial](#) if you need a reminder about EU energy labels.



- Are any of the appliances automatically switched on and off? If so, at what times? The caretaker could help with this question.
- Are any of the appliances manually switched on and off at particular times? E.g. sometimes computers in a school are switched on every day before pupils arrive. The caretaker could help with this question.
- Also include a section for notes about how appliances are being used, which you can fill in based on short interviews or by observing behaviours (refer back to the [Energy Tutorial](#) for ideas for things to look out for and assess)

Once finished, print off your lighting and electrical appliances audit forms ready to fill in during the audits over the next two weeks. Think about what you'll need during the audits and take these things with you – otherwise it could be a long walk! This might include pens, paper, information about different light bulbs and appliances, a plan of the layout of the building or a Google Earth bird's eye view.

## Week 9-10



Complete the lighting and electrical appliances audits during these two weeks by visiting each room in turn and filling in your audit forms. If you're volunteering as part of a group, you could do this in pairs or small groups.

Keep your eyes peeled and double check your audit forms to make sure you don't forget anything.

## Week 11



Well done for completing your first audits! You will now be able to look at your results to find ways to save energy.

Start by having a look at your observations recorded in the lighting audit form and think about how energy could be saved in each room. Here are some questions to consider:

- Were any lights switched on in empty rooms?
- Which room used the most energy (the highest number of Watts) to power its light bulbs?
- Was the number of lights suitable for what the room is used for? If you had access to a light meter, was the level of light recorded suitable for what the room is used for?
- How many energy saving light bulbs (e.g. LEDs) were there in the building? Where could energy saving light bulbs be used instead of other light bulbs?

- How could the people who use the building be encouraged to change their behaviour to reduce the amount of energy used to power the light bulbs?

Write a list of energy saving tips for each room.

## Week 12



Now have a look at your observations recorded in the appliances audit form and write another list of energy saving tips for each room. Here are some questions to consider:

- Were any appliances switched on when not in use?
- Were any appliances left on standby?
- What were the energy ratings of the appliances?
- Could any appliances be automatically/manually switched on later or off earlier to save energy?
- How are the appliances being used?

## Week 13



It's time to plan the tasks that need to be completed to carry out the heating and hot water audits. These audits will include the tasks below, but there might be other things you need to do to collect the energy bill data and to complete the audits.

- Collect gas bill data for the last year (or three years if possible)
- Analyse the bill data to determine current gas consumption
- Design audit forms for assessing heating and hot water use in the building
- Visit the building to fill in the audit forms
- Assess the results of the audits and identify ways to save energy
- Anything else?

By the end of this week you should have agreed who is going to do what (if you're volunteering as part of a group), as well as planned and agreed a date and time for the audits.

Once you've completed these audits, you'll write up the results from all the audits you've completed and present your findings to the person who is in charge of energy (either in person or by sending them a written summary), as well as sharing the message about your project with your community. You might want to start making arrangements for this now.

## Week 14



It's time to find out the actual gas consumption of the building. Collect copies of the gas bills for the building for the last year (or three years if possible). If your chosen building is a school, the school bursar should have this information.

Like last time, find out the total kWh used per bill (mainly in quarterly bills) and costs for gas. Write down these figures or record them in an Excel spreadsheet. How do the gas costs compare between different quarters and years? Can you think of any reasons why this might be?

If you have time, convert the kWh to CO<sub>2</sub> emissions by multiplying kWh by 0.184 (this is the carbon 'conversion factor' for gas) and record this in your notes or spreadsheet.

You now have the baseline energy figures for the building!

NOTE: Usually buildings use gas for space and water heating, but sometimes another type of energy is used instead. If the building uses electricity for heating, remember to consider the electricity bill data collected previously for the heating audits.

## Week 15



This week you're going to design a space heating audit form which you'll take with you to fill in during the audit. This form could include:

- Date and time of the audit
- What type of space heating is used in the building? (e.g. gas, electric, coal, solar thermal, other – the caretaker could be able to help with this)
- Room number
- What the room is used for
- Is the room empty?
- Corridor reference (e.g. number or location)
- Room or corridor temperature (can you take a room thermometer?)
- Radiator temperature (can you take an infrared thermometer?)
- Do radiators have thermostatic radiator valves?
- Thermostat settings (the caretaker could help with this)
- Are any external doors or windows open with the heating on?

## Week 16



Next, design a hot water audit form. This form could include:

- Date and time of the audit
- What type of water heating is used in the building? (e.g. gas, electric, coal, solar thermal, other – the caretaker could be able to help with this)
- Temperature of hot water cylinder thermostat. How much insulation is there around the hot water cylinder (in millimetres)? You must be supervised by the caretaker or another responsible adult when assessing the hot water cylinder.
- Is water heating controlled by a timer so that water is only heated at certain times of the day? If yes, at what times during the day is the water heated? If you're auditing a school, is the water heated during school holidays? Make sure you're supervised for this part too. The caretaker could help to answer these questions.
- Number of hot taps dripping or leaking

Once finished, print off your heating and hot water audit forms ready to fill in during the audits over the next two weeks. Make sure you've planned everything you need to take with you.

## Week 17-18



Complete the heating and hot water audits during these two weeks, filling in your audit forms as you go. If you're volunteering as part of a group, you could do this in pairs or small groups.

If you're using a room thermometer for the heating audit, leave the room thermometer in the middle of the room for a minute or so to accurately record the temperature. To use infrared thermometers to record radiator temperatures, point the infrared thermometer at the radiator and press the button.

Keep your eyes peeled and double check your audit forms to make sure you don't forget anything.

## Week 19



Well done for completing your final audits! You will now be able to look at your results to find ways to save energy.

Start by having a look at your observations recorded in the heating audit form and think about how energy could be saved. Here are some questions to consider:

- Were the room and corridor temperatures too high or too low? What temperatures were the thermostats set at?
  - In schools, it is recommended that normal teaching rooms are heated to 18°C, circulation spaces (e.g. corridors) and areas of high activity (e.g. sports halls) are heated to 15°C, and areas of low activity or used by young children or those with special needs are heated to 21°C. These temperatures can be used as a guide for other non-domestic buildings.
  - In homes, it is recommended that rooms are heated to between 18°C and 21°C. The temperature should be as close to 18°C as is comfortable (closer to 21°C for young children, ill or vulnerable people and the elderly).
- How many radiators didn't have thermostatic radiator valves?
- Were any external doors or windows open when the heating was on? This would mean expensive heat is escaping from the building!

Write a list of energy saving tips for each room.

## Week 20



Now have a look at your observations recorded in the hot water audit form and write another list of energy saving tips for each room. Here are some questions to consider:

- What temperature was the hot water cylinder thermostat set at? The recommended temperature is 60-65°C.
- How much insulation was there around the hot water cylinder? The recommended amount of insulation is at least 75mm.
- Was the water heating controlled by a timer so that water is only heated at certain times during the day? If yes, at what times during the day is the water heated? Might the hot water system be on for longer than it's needed? If you audited a school, is the water heated during school holidays?
- How many hot taps were dripping or leaking?

## Week 21



Now you're ready to share your findings with the person who is in charge of energy for the building to help them save energy. You might have already planned everything for this already, but if not, decide whether you will present your findings in person or by sending the relevant person a written summary of your observations and

energy saving tips. This might involve arranging a meeting with the relevant person or arranging to give a presentation.

Think about how you're going to communicate your findings. Use the rest of your time this week to prepare materials that you will use to communicate your findings next week, such as a PowerPoint presentation or a written report. How will you explain the reason for the tips you have chosen? How will you persuade the person who is in charge of energy to follow your recommendations?

Facts and figures are a good way to persuade people to save energy. Can you calculate the amount of energy, money and CO<sub>2</sub> emissions they could save through carrying out your energy saving tips using figures published by sources such as the Energy Saving Trust?

Make sure you have made a note of your key points and print off anything you need to take with you.

## Week 22



This week you will share your findings with the person who is in charge of energy for the building. You could be giving a presentation, having a meeting or sending a written summary with an explanation of your recommended energy saving tips.

## Week 23-24



Now that you've completed your audit and presented your findings to the person who's in charge of energy, use these two weeks to prepare some material to share with the wider community to spread the message about your project.

Start by deciding how you will share the message and with who. You could give a talk for your classmates, use social media, contact the local newspaper or write an article for a newsletter. Remember to explain why your project is important in terms of helping people to improve how they use energy, describe what you've done and the impact of your project in terms of the energy savings you identified. Make sure you get permission from the building owner to share the data collected from the energy bills and audit forms if you want to include this information.

## Week 25



It's time to share your achievements with your wider community. You could be giving a presentation, promoting an article you've written or using social media to spread the message about your project. Try to share your achievements as widely as possible!

And finally, don't forget to thank all the people who have helped you with your project.

## Week 26



Congratulations on completing your energy saving project! It's time to evaluate your project and reflect on your achievements by filling in the End of Project Survey. To claim your Energy Envoys Certificate from the National Energy Foundation, please fill in the survey by [clicking here](#) and send your photos, videos and other materials produced to [energyenvoys@nef.org.uk](mailto:energyenvoys@nef.org.uk).

Thank you for volunteering with us!