Bright Sparks

Staying safe around electricity

Energy Efficiency Booklet for P-6

The booklet is designed as an introduction to Energy Efficiency for Primary Schools across Tasmania

TasNetworks | Powering a Bright Future

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Overview

Bright Sparks Program

This **Energy Efficiency booklet** provides opportunities to strengthen student understanding of energy efficiency through a series of activities designed to complement the TasNetworks Electrical Safety in Schools program, Bright Sparks.

The Bright Sparks Program is a free service which aims to reduce the risk of electrical incidents and prevent tragic accidents by educating primary school children across Tasmania about electrical dangers, as well as encouraging safe and responsible practices.

As part of the program,TasNetworks delivers interactive school presentations designed for two audience groups:

- Prep to Year 2
- Year 3 to Year 6

These presentations focus on defining electricity, electrical safety in and outside the home, using electricity more efficiently and an introduction to renewable & sustainable energy.

Key messages include:

- Stay away from Danger signs
- Kangaroo hop to safety
- Throw away frayed cords
- Charge devices safely
- Water and electricity don't mix

Using a mix of hands-on activities anchored by a power point slide, with engaging characters, the program is delivered to an average of 50 schools and community groups annually.

To schedule a Bright Sparks visit, please contact:

brightsparks@tasnetworks.com.au or

www.tasnetworks.com.au/brightsparks

Overview

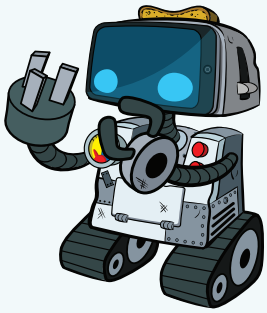
Meet the characters!

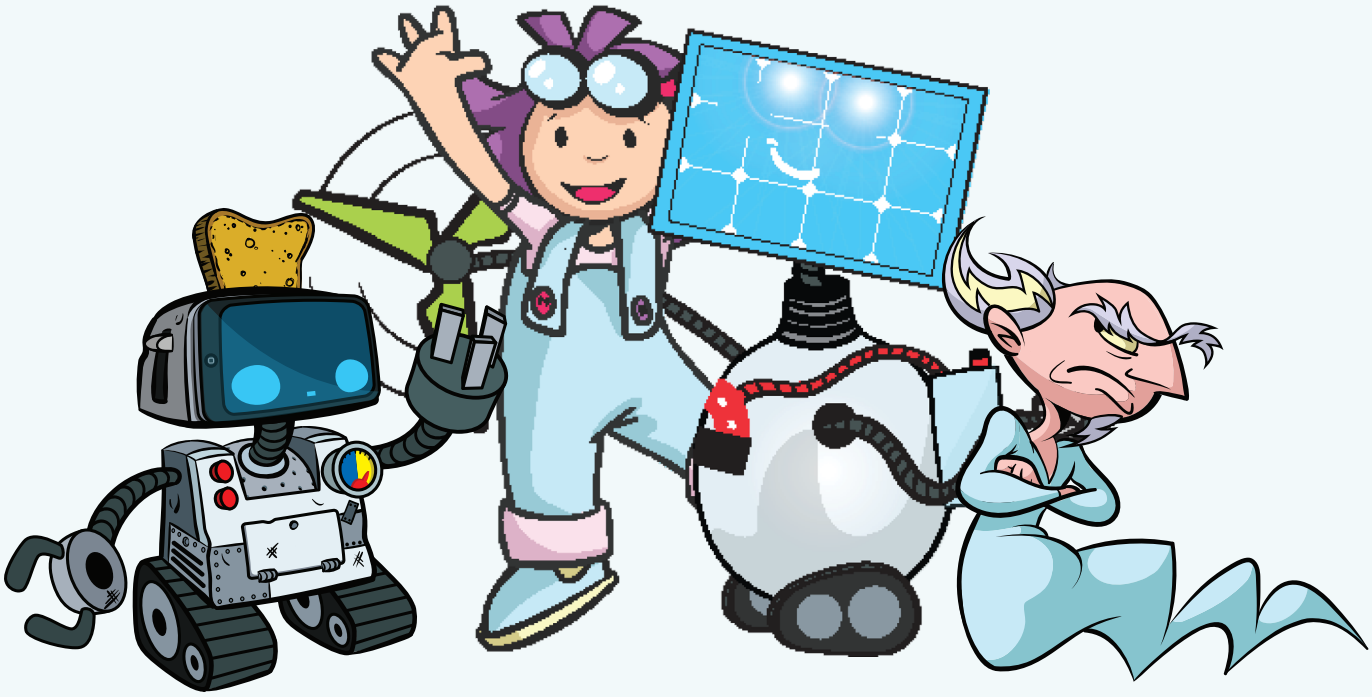
Hi! I'm Sparks and I love to build things. I am in all the presentations and teach my friends how to stay safe around electricity. Let me introduce you to the other characters.

This is Switch. He is powered by renewable energy and shows us how to save electricity.

Shocker does lots of dangerous things around electricity. I help my Kinder to Grade 2 friends watch out for Shocker so he doesn't hurt them.

Say hello to Socket! I built her from different electrical things. My Grade 3 - 6 friends help me to teach Socket how to be safe around electricity.





Introduction

Teacher Background Information

Electricity or 'energy' is used everyday with not much thought about how much it costs, or the effect it can have on the environment.

This booklet aims to teach students about the positive impacts being more energy efficient can have on life style and the environment, as well as the reduction of school and household energy costs.

Key Energy Efficiency Messages

It is important to ensure that all students are aware of the key energy efficiency messages at the completion of this booklet.

- **Lighting:** Lighting makes up between 8% to 15% of household energy use
- **Heating and cooling:** Around 40-50% of household power use goes on heating, but there are a lot of things you can do to lower your heating costs while still keeping warm in the cooler months.
- **Hot Water:** Hot water is responsible for around 25% of the average household energy bill. Taking steps to increase hot water energy efficiency will save on energy bills while maintaining similar levels of performance, comfort and convenience:
- **Appliances:** Overall, household appliances can account for up to one third of your energy bill, with refrigeration making up about seven per cent and cooking around 9% of energy used in the average Tasmanian household.
- **Fridges and Cooking:** Just like changes to the way you use appliances, changes to the way you cook can help reduce energy usage as well.
- **Energy Rating Label:** The Energy Rating Label, regulated by government, has been around for over 30 years, so you can compare the energy efficiency and running costs of appliances before you buy – to help reduce your electricity bill.
- **Stand by energy:** Stand by energy, is the energy used by an appliance when it is in stand by mode. Standby energy can use 10 per cent of a household's electricity use. Some appliances can use much more energy over a year in standby than in actual operation
- **Life style choices:** Making small changes to your lifestyle and habits around the home can have a big impact on your energy costs.

Other information

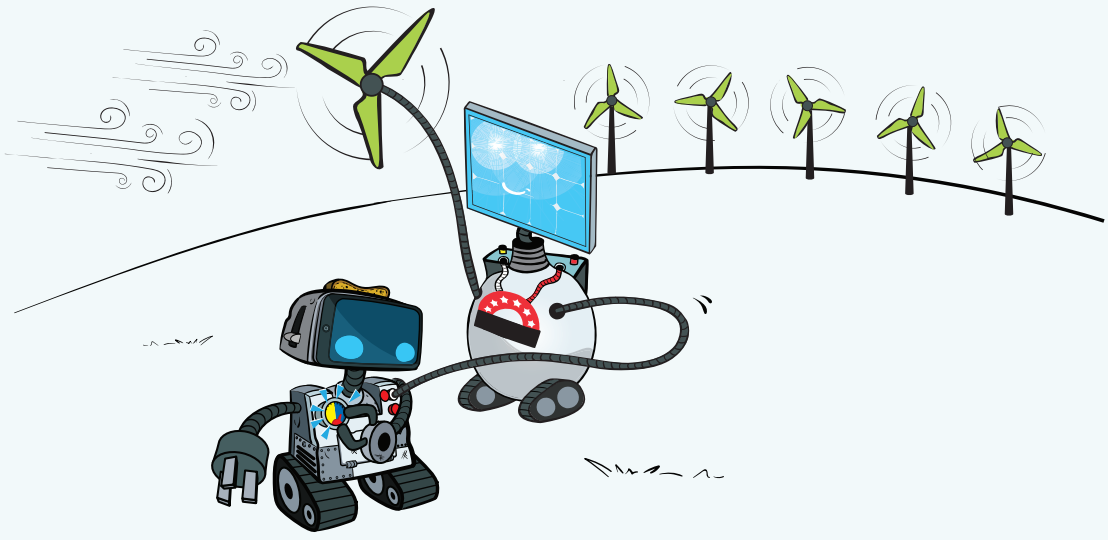
We'll also discuss other topics such as Thermodynamics and the importance of looking at what different energy retailers can offer familes as a way to reduce energy costs.

Activities

This booklet also contains lots of fun activites for the classroom & at home, to help students put their learning into action. Most of the activities are stand alone and require minimum preparation with materials found around the home, or at most craft or science stores. Adult supervision is required, especially with hot items or circuitry.

Join Sparks, Switch and Socket as they explore:

- How colour can affect the absorption of heat
- Easy steps to draught proof a room
- What insulation is and how it works
- Building a solar oven
- The passive house movement and practice designing their own energy efficient dwelling
- A typical electricity bill and understand the different parts of the bill such as tariffs, networks charges and off peak/on peak rate



Energy Efficiency

What is Energy Efficiency?

DEFINTION: Energy efficiency is using less energy to perform the same function with minimal waste. It's a way of conserving or saving energy by using it more wisely.

Why should we be more energy efficient?

Electricity or 'energy' is used everyday with not much thought about how much it costs, or the effect it can have on the environment.

Using energy more efficiently can help reduce household costs and minimise our impact on the environment including the reduction of greenhouse gas emissions.

People use energy for transportation, cooking, heating and cooling rooms, manufacturing, lighting, entertainment, and many other uses.

The choices people make about how they use energy—turning machines off when they're not using them or choosing to buy fuel-efficient vehicles and energy-efficient appliances—affects the environment and people's lives.

How can we be more energy efficient?

There are many ways we can be more energy efficient.

In this booklet you will learn about some of these ways and the positive impacts they can have on household costs, life style and the environment

Changing your power habits can help save energy and money. It's the little things that make the biggest difference save energy and money.

How can we save energy?

Message 1 - Lighting

Lighting makes up between 8% to 15% of household energy use. Some simple changes will help reduce costs.

Here are some easy ways to help keep lighting costs down:

- Turn off lights when they're not needed.
- Paint walls in light colours (light colours reflect light)
- Use LED or compact fluorescent lamps (CFL) instead of incandescent globes (the ordinary older style globes) – they require five times less energy than ordinary bulbs for the same amount of light.
- Light dimmers allow lights to operate on a lower amount of power which saves you on power costs!
- Install time, motion or light-sensing switches to your security lights.
- Make the most of natural light, open your curtains and blinds during the day.
- Dust can dim your lights, so dust them regularly. Clean lamps and diffusers regularly as dust causes loss of efficiency.
- Invest in solar lights (they charge up during the day and come on when it gets dark!
- Avoid using low voltage halogen downlights for general lighting as they are not energy efficient. Low voltage does not mean low energy consumption. Compact fluorescent and LED replacements for downlights are now available.
- Use timers or sensors on outdoor security lights

1. Incandescent

2. Compact fluorescent (CFL)

3. LED

Message 2 - Heating and cooling

Around 40-50% of household power use goes on heating, but there are a lot of things you can do to lower your heating costs while still keeping warm in the cooler months.

We've added some ideas below:

- Set your heater between 18°C and 21°C.
- Use the correct size heater for the room
- Use timers to turn your heating on when you need it and turn off when you don't
- If you're home alone, use an electric throw to warm yourself
- Keep heat-pump filters clean and free of dust
- Don't put furniture and other things in front of your heater, it disrupts airflow and takes longer for the room to heat up
- Reduce loss of heat by closing doors to any rooms that are not occupied
- Use a draught stopper around doors and windows to keep the heat inside
- Ensure there are no air gaps around doors, windows and ceilings
- Only heat areas where you need it
- Closing curtains or blinds as soon as the sun is off the house will hold in the solar heat from the sun
- In warmer weather pull curtains, blinds, or external shutters to keep the sun's heat out of the house
- Use fans to create nice cool breezes
- In winter use a ceiling fan to send warm air downwards – especially if you have high ceilings or an open staircase

+1°C= ↑$ x 15%

Every 1°C increase in temperature, increases your heating bill by around 15%.

Message 3 - Hot Water

By reducing the amount of water you use, you can reduce hot water running costs. Below are some simple & inexpensive ways to reduce hot water usage:

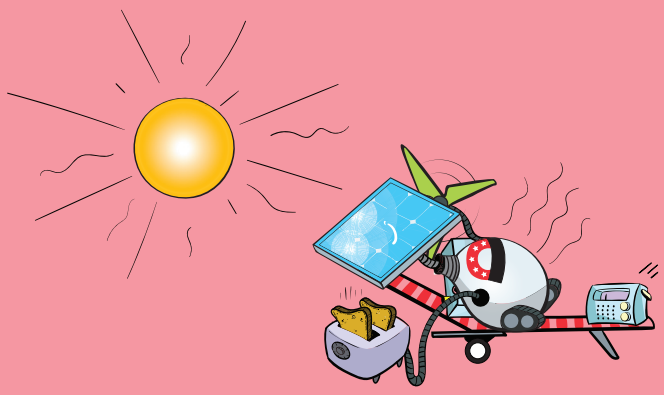
- Be sure to turn off hot water taps so they don't drip or leak
- Cover a continually heated outdoor hot tub when it's not being used
- Turn off the hot water system when on holidays
- Use mixer taps in the cold position unless you really want hot water
- Have a timer for your showers. Other than baths, showers usually use the most hot water in a home
- Check your hot water unit and make sure it is at the right temperature – not too hot
- Use a water saving shower-head in your shower
- Use cold water to rinse your clothes and dishes

The hot water thermostat should be set between 60 and 65°C. If the thermostat is set below 60°C harmful bacteria can build up

Message 4 - Appliances

There are lots of ways to reduce energy usage with everyday appliances. Listed below are some simple strategies to help keep energy usage down and save on running costs:

- Turn appliances like TV's, computers and game consoles off at the wall
- Charge your phone during the day so that you can unplug it when fully charged (instead of leaving it plugged in all night!)
- An appliance in poor condition usually uses more energy than one in good condition.
- Dry clothes on a line rather than in the clothes dryer. Save the clothes dryer for a rainy day
- Use cold-water washing and economy cycles to wash clothes.
- Use appropriate load sizes or cycles for clothes washers and clothes dryers.
- Ensure the dishwasher is full before turning it on and use the economy cycle
- Select 'energy saving' or 'economy' settings on appliances, if available
- Large screen TVs use more energy than those with smaller screens
- Face screens away from direct light and turn the brightness level down.
- An LCD screen for desktop computers is more efficient than an older style screen, using less energy and taking up less space.
- Switch off computers and printers if you won't be using them for half an hour or more



'If you switched from washing half a load of washing every day on warm wash to washing a full load every day on a cold wash, you would save $135.85 a year'
- CHOICE website

Message 5 - Fridges & Cooking

Just like changes to the way you use appliances, changes to the way you cook can help reduce energy usage as well. We've outlined a few simple changes below:

- Use a microwave rather than an oven, they use less than half the energy
- Make sure your oven and fridge door seals are clean and in good condition
- When using a kettle, boil only the amount of water needed
- Efficient cooking methods include using pots with fitted lids, simmering instead of boiling and using a pressure cooker
- Remember to use the thermometer or timer on your oven to avoid over-cooking
- Only open the oven door when you have to during cooking
- Allow hot things to cool before putting them into the fridge
- If you have an extra fridge or freezer, only turn it on when it's needed
- Defrost fridges regularly as they will run more efficiently after being defrosted
- Place your fridge or freezer in a cool spot out of direct sunlight and away from cookers, heaters and dishwashers
- Keep the temperature in your refrigerator between 3°C. and 5°C. .
- Keep the temperature in your freezer between -18°C. and -15°C.
- Make sure the warm air can escape from the back of the fridge or freezer by leaving a space between the back of the unit and the wall

Fan forced ovens are about 30 % more efficient than conventional ovens, which can waste up to 90 % of the energy used

Message 6 - Energy Ratings

The Energy Rating Label helps you compare the energy efficiency and running costs of appliances before you buy which can help reduce your electricity bill.

Below are some tips to consider when looking at the Energy Rating Labels:

- When buying new appliances choose energy efficient models to save on energy costs
- The higher the efficiency rating, the less it costs to run
- High start-rated models can cost a little more to purchase, but choosing a a less energy efficient model because it's cheaper could end up costing more over the long term
- Energy efficient appliances consume less energy, save money and reduce greenhouse gas emissions
- Every new washing machine, dryer, dishwasher, TV and fridge sold in Australia and New Zealand meet a minimum standard for energy efficiency. If it doesn't, it's against the law to sell it.
- The least efficient products allowed to be sold in Australia are given one just star – whereas the most efficient are given 10

Message 7 - Stand by energy

Stand by energy, is the energy used by an appliance when it is in stand by mode. Some appliances can use much more energy over a year in standby than in actual operation.

Below are some hints & tips to look out for:

- Be aware of the standby energy use of electrical equipment such as TVs, videos, clocks, computers, faxes, microwaves, security systems, battery chargers and power packs.
- In standby mode, the appliance is still drawing power even when turned off. Turn off the appliance at its main 'ON' switch or power point.
- Often power points are behind desks or entertainment units and can be hard to turn off. Use a power board fitted with 'ON' switches placed in an easy-to-reach location.
- The illuminated switch can remind you to turn the whole board off when not in use.

Stand by energy, is the energy used by an appliance when it is in stand by mode. This is also referred to as **"vampire power"**

Message 8 - Life style choices

Saving energy isn't just about making changes to the way you use your energy, it's also about life style choices that will not only help reduce energy usage, but have a positive impact on the environment. Some simple life style choices are listed below:

- Swap cling wrap for sustainable beeswax food wraps
- Use compostable sponges instead of paper towels
- Use reusable produce bags instead of single use plastic such as cling wrap.
- Use a compost bin for food waste
- Plant trees and large shrubs away from powerlines to reduce the risk of power outages
- Recycle according to your local council's guidelines to limit the rubbish in landfill
- Plant a vegetable garden or grow herbs in pots to pick fresh when you need them.
- Join your local community garden to learn gardening and sustainability tips.

Making simple lifestyle choices, such as 'reduce, reuse and recycle' is good for the environment and our society.

Thermodynamics

Thermodynamics is the science of how heat and energy move and change things - like when ice melts, water boils, or engines run.

By learning how energy works, we can use it more wisely, which helps us save money and take care of the planet.

Energy Retailers

Tasmania has different electricity retailers because it gives people choices about who they want to buy their electricity from -just like choosing which shop to buy your snacks from!

These electricity retailers all buy power (like from the wind, water, or sun) and then sell it to homes and businesses.

When there are different companies, they can offer better prices or special deals, and people can pick the one that works best for them.

The sun gives off enough energy every hour to power the whole Earth for a year!

Energy in schools

Energy Consumption in schools

As expected, schools use a lot of energy, however there are many low costs solutions to reducing consumption, especially around lighting, heating & cooling and technology.

This module looks at some of the simple ways to reduces energy usage and help your school become more energy efficient, starting in your classroom.

*A great way to determine the amount of energy used in your school, is to conduct an energy audit - there is more information on how to do this in the 'Classroom Section' of this booklet.

Breakdown of energy costs.

Schools use energy in four main areas: lighting, heating and cooling, technology and hot water.

- **Lighting** usually accounts for 4% of Tasmanian power bills.
- **Heating and cooling** can make up to 50% of power bills.
- In schools, **technology** includes laptops, smart tvs, and printers.
- **Hot water** use may make up 25% of electricity use.

A 2022 study into energy consumption in Australian primary schools found that each student used an average of 542kWh per year. - *Daly et. al*

Lighting

Have you ever had a power outage whilst at school? Did you find it difficult to read a page in a book? Even though we go to school during the day, without proper lighting it can still be difficult to see and concentrate in class.

To reduce the amount of electricity used to light a room, the following ideas are recommended:

- Paint the walls in light colours to reflect natural and artificial lights. This can also make students and teachers feel happier.
- When the school maintenance team clean the lights often, they stay bright.
- Replace old light bulbs with more energy efficient LED ones.
- Orientate the classroom to take advantage of natural light from windows.

Heating & cooling

Proper heating, ventilation and air-conditioning are vital to feeling comfortable at school.

When classrooms are too hot, it can be difficult to concentrate and listen to the teacher. It can even be hard to think of the right answers.

Studies show that if a classroom's temperature is cooler, students can focus and learn better. 2.3% better for every 1°C. cooler! (Daly et. al 2022)

On the flip side, no one likes to be shivering away in a cold room, so, it is important that the learning environment is at the right temperature, about 21°C. .

A well-maintained heat pump is great way of saving electricity and keeping the room warm.

Another important part of a nice classroom environment is air quality. No one likes smelly, stuffy spaces, it can make you feel tired or sick.

Demand controlled ventilation automatically changes the way the air moves when needed. It keeps the air in a classroom fresh and lowers energy use by 15% (compared to a standard ventilation system), all without opening a window!

The Tasmanian Department of Education's **'Built Environment Guide'** explains how building design can make schools a comfortable, safe & welcoming space, and kind to the environment.

Technology

Technology makes learning fun, whether it is Minecraft education, interactive displays or 3D printing. The monitor or display of tvs or laptops account for most of its energy use.

While these devices don't use as much electricity as heating and hot water, schools may save about 3% on their power bill through the following tips:

- Position screens away from direct sunlight. This reduces the display's brightness needs.
- Fight '**vampire energy**' by turning devices off at the wall when not in use.
- Buy new devices based on their energy star ratings.
- Energy saving power-boards (SPC) can lower the amount of electricity devices use.
- Maintain and service technology such as printers regularly to ensure they are running smoothly.
- Devices left in the sun may use more energy to keep their batteries and fan motors cool.

Energy used outside of school hours

Tasmanian schools are not used for about 6,000 hours a year. This includes after school weeknights, weekends and school holidays.

Some suggestions for reducing electricity outside of school hours are:

- Turn off air conditioners, lights and hot water cylinders that are not needed.
- Motion sensors or timers for lights so they don't have to stay on all night.
- Improve insulation and use smart thermostats with timers.
- Unplug unused devices
- Turn off hot water cylinders over school holidays.

"Vampire power" is electricity that appliances use even when they are turned off but still plugged in or on standby. - *Energy Australia website*

Hot water

When we think about what uses electricity at school, we often think of lights, computers, or heaters—not hot water. But hot water uses electricity too, and it's needed for lots of important things, like:

- Washing hands
- Cleaning dishes
- Mopping floors
- Science, cooking or art projects
- Hot drinks

At school, hot water usually comes from hot water systems, like the ones in homes. Schools also use water urns in staffrooms and science rooms. Hot water systems are like giant kettles—they heat up water and keep it warm all day. Even when no one is using the water, the system uses electricity to stop the water from getting cold.

Because hot water systems use electricity all the time, they can waste energy—especially after school, on weekends, or during holidays when no one is using them. Here are some smart ways schools can use less electricity to heat water:

- Set timers to switch off hot water tanks when the school is closed
- Switch off urns, dishwashers, and kettles at the power point when they're not being used
- Install heat pump systems, which are newer and use less electricity than old-style hot water tanks
- Keep hot water pipes as short as possible, so less heat is lost while the water travels

Saving energy helps the environment and saves money - soschoolscanspendmoreonlearning and fun!

Energy Consumption

INTRODUCTION: A great way to help you reduce your energy usage, is to find out how much appliances cost to run.

The below steps show you how to find the information you need to estimate the maximum running cost per hour, day and per year.

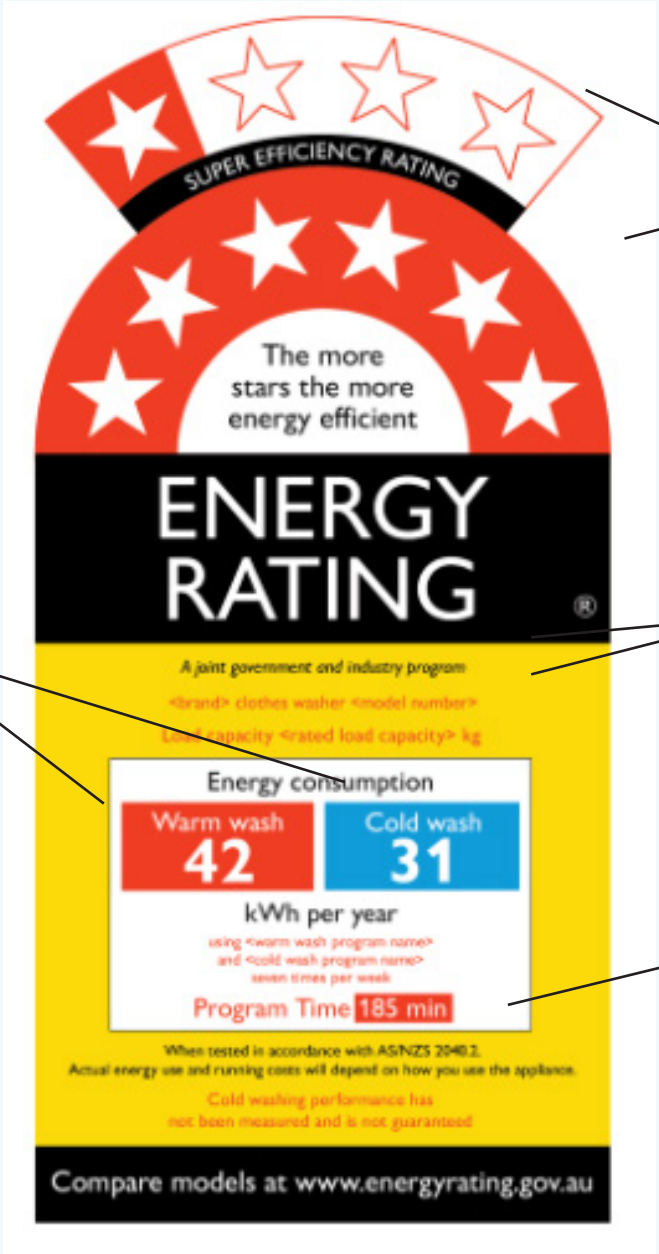
How to estimate maximum running costs

STEP	ACTION	EXAMPLE
1	Find out how much you pay per unit of electricity (cents per hour) This will show under the ' energy tariff rate' section of most power bills (See 'Bossing your bill' for more information)	If unsure, use 30c per kWh
2	Find out how much input power the product uses in kilowatts (kW) The input power is usually marked on the appliance label or in watts (w) or kilowatts (kW)	Label Shows 2400w = 2.4kw
3	If input power is measured in w, convert to kW 1000 watts = 1 kilowatt	Divide 2400 by 1000 = 2.4kW
4	Estimate hourly running cost Multiply the cents per hour (Step 1) by the input power (Step 2/3)	30 x 2.4 = 72 cents per hour
5	Estimate daily running cost. Multiply the hourly cost by the typical number of hours you use the appliance Divide by 100 to get the dollar amount	72 x 5 hours per day = 360 360 divided by 100 = $3.60 per day
6	Estimate the yearly running cost Multiply the daily cost by the typical number of days you use the appliance	$3.60 per day x 4 day = $14.40 year

Energy Ratings

The Energy Rating Label helps you compare the energy efficiency and running costs of appliances before you buy which can help reduce your electricity bill.

Below are some tips to consider when looking at the Energy Rating Labels:



Number of stars

How much electricity the appliance uses in a year depending on the wash temperature

Information about the appliance

Information about the setting the appliance was tested at.

Really energy-efficient appliances have two sets of stars.

Estimate maximum running costs

INSTRUCTIONS: Now that you know how to calculate running costs, uses the table below to calculate the yearly running costs of the listed appliances with the below assumptions applied.

Calculations:

Cents per hour x Kilowatts (kw) = Hourly running cost

Hourly running costs x hours of use per day = Daily Running Costs

Daily running costs x days of use per year = Yearly Running Costs

APPLIANCE	ASSUMPTION	CALCULATION	RUNNING COST
Washing machine	7 uses a week using a warm wash		
Clothes dryer	1 full load a week		
Dishwashers	7 uses a week at 'normal' setting		
Televisions & computer monitors	10 hours use plus 14 hours in standby a day		
Fridges & freezers	In use 24 hours a day		

The average mobile phone uses about 3kWh per year. The older the battery, the less efficient the phone.
- *Compare the Market* website

Activities

The following activites are for use in the home and classroom, and are designed to help students learn more about being energy efficiency and how it can benefit their school and family.

Classroom Energy Efficiency Activities

Activity 1: Energy Action Checklist

Activity 2: Classroom Energy Audit Checklist

Activity 3: Classroom Energy Improvements

Activity 4: Design an Energy Efficient House

Activity 5: Life Without Energy

Activity 6: Energy Selfie

Activity 7: My Energy Collage

Activity 8: Energy Efficiency Quiz

Activity 9: Energy Reflections

At Home Energy Efficiency Activities

Activity 1: Home Energy Audit Checklist

Activity 2: Home Energy Improvements

Activity 3: Rate Your Appliances

Activity 4: Fantastic Fridges

Activity 5: Icy Insulation

Activity 6: Layered Lunchbox

Activity 7: Heater Heroes

Activity 8: Look, Hear Feel

Activity 9: Draught Proofing

Thermodynamic Activities

Activity 1: Hot Stuff

Activity 2: Window Watchers

Activity 3: Solar Ovens

Energy Retailer Activities

Activity 1: Power to Choose

Activity 2: Bossing your Bill

Activity 3: Tackling Tarrifs

Classroom Activities

1. Energy Action Checklist

INSTRUCTIONS: Divide students into groups and have them discuss what they have learnt in the energy efficiency messages.

Using the template below, have students suggest 10 simple ways to use energy more wisely.

We've already populated the first one for you.

1. Turn off lights when they aren't being used
2.
3.
4.
5.
6.
7.
8.
9.
10.

Classroom Activities

2. Classroom energy audit checklist

INTRODUCTION: Use the blow table to record all the appliances that are used in your classroom. Using the energy consumption formula, determine how much energy is used and the maximum running costs of each appliance.

Once this has been completed, use the table in activity 3 to make a list of improvements that can be made to help reduce your classroom energy consumption

APPLIANCE	TOTAL NUMBER	AVERAGE WATTAGE	HOURS USED PER DAY	NUMBER OF DAYS USED PER YEAR
Computer/ Laptop				
Lighting				
Air conditioner				
Ceiling Fan				
Printer				
Photocopier				
Telephone				
Chargers (mobile phone, tablet etc)				
TV/Smart Board				

Classroom Activities

3. Classroom energy improvements

INTRODUCTION: Based on what you have learnt so far, make a list of improvements you could make in your classroom, to help reduce the energy used.

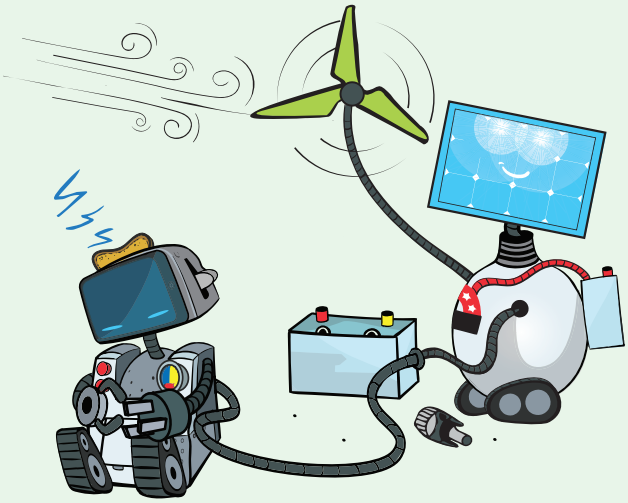
WHAT COULD BE CHANGED TO HELP REDUCE ENERGY?	WHO IS RESPONSIBLE FOR THIS CHANGE?

Classroom Activities

Activity 4: Design an Energy Efficient House

INTRODUCTION: Passive houses are designed to use very low amounts of electricity for heating or cooling. **Key features of a passive house include:**

1. Insulation - Thick walls, floors, and roofs to keep the air warm or cool.
2. Airtight Construction - Doors and windwos are sealed tightly to stop the sneaky draughts.
3. Triple-glazed Windows - three layers of glass to keep the heat in.
4. No Thermal Bridges - No cold spots! Everything is built carefully so no part of the house feels colder than the rest.
5. Mechanical Ventilation - a special machine brings in fresh air and keeps it at just the right temperature. It's like lungs for your house.
6. Solar Orientation - The house is designed to face the sun in winter and to have shade during the hot summertime.
7. Energy Demand - Helps the planet and power bills by using much less electricity than a normal house!



Passive houses use a combination of insulation, ventilation and orientation to create an energy effience environment.

Classroom Activities

Activity 4: Design an Energy Efficient House

Activity

Design a passive house on the next page.

Then build a model using materials that you have around your house such as :

- Cardboard
- Plywood
- Fabric
- Cotton wool
- Foam
- Polyfill (stuffing)
- Paper
- Cling wrap
- Corrugated cardboard
- Al-foil
- Straws
- Wool
- Icypole sticks
- Bubble wrap
- Newspaper
- Clear plastic sheets or acetate (for 'glass' windows)
- Pencils
- Ruler
- Clay or plasticine
- PVA glue
- Blu-Tac
- Paint

Optional: Use a small solar panel kit or LED lights (sourced from science stores, always follow instructions)

Decorate with toy furniture etc.

The world's largest certified Passive House is 'The House at Cornell Tech' in New York City. It is 26-stories high and houses grad students. - *UCL website*

Classroom Activities

Activity 4: Design an Energy Efficient House cont.

My House Design

A passive house can save up to 90% of the energy used to heat and cool a normal house - *Australian Passivhaus Association*

Classroom Activities

Activity 5: Life without energy

What do you think life would be like without energy?

Write a pro's & con's list below:

PROS	CONS

The first Tasmanian power poles and wires were installed in the early 1900s.

Classroom Activities

Activity 6: Energy selfie

INTRODUCTION: Take a selfie with an energy saving solution and paste it below.

Hint: Think about something you have done to save electricity, such as wearing nice fluffy slippers and a cosy oodie!

My Energy Selfie!

Tasmania's electricity is 96% renewable, generated by hydro, solar and wind power.

Classroom Activities

Activity 7: Energy consumption collage

INTRODUCTION: Make a collage below showing the things you have learnt about where you use electricity. It might include you watching TV with the light on, or the journey electricity takes to get to your house. Time to get creative.

Hint: Use paper, pens, and paints to create a colourful picture!

My Energy Collage!

Classroom Activities

Activity 8: Energy efficiency quiz

INTRODUCTION: Let's review all that you have learnt.

Find the answers in the Acknowledgements and references part of this booklet.

1. True or False: Leaving your TV on standby still uses electricity.

2. What should you do with your phone charger once your phone is fully charged?

A. Leave it plugged in all night
B. Unplug it to save energy
C. Charge it again just in case
D. Put it in the fridge

3. True or False: Turning off the light when you leave the room saves energy.

4. Which of these helps reduce how much power your heater uses?

A. Leaving doors open
B. Blocking the heater with furniture
C. Keeping windows open
D. Closing doors and using a draft stopper

5. What's the best temperature to set your heater in winter?

A. 15°C
B. 18°C–21°C
C. 25°C
D. As hot as it goes

6. Why is it better to use a microwave than an oven?

A. Microwaves are more fun
B. Ovens can explode
C. Microwaves use less than half the energy
D. Microwaved food taste better

7. What should you look for when buying a new appliance to save energy?

A.The colour
B. How big it is
C.The number of buttons
D.The Energy Rating Label (more stars = better!)

8. Which of these helps your fridge use less power?

A. Putting it in direct sunlight
B. Leaving the door open
C. Keeping the back cool and dust-free
D. Stuffing it full of hot food

Classroom Activities

Activity 8: Energy efficiency quiz

9. What's one smart way to save power with your washing machine?
   - **A.** Wash clothes in hot water every time
   - **B.** Use cold water and economy cycles
   - **C.** Wash only one sock at a time
   - **D.** Add more soap than needed

10. What is the best way to dry clothes to save electricity?
   - **A.** In a dryer every day
   - **B.** By hanging them outside in the sun
   - **C.** By using a hair dryer
   - **D.** On the heater

11. What kind of lights use the least energy?
   - **A.** Candles
   - **B.** LED or CFL lights
   - **C.** Incandescent bulbs (old-fashioned ones)
   - **D.** Lava lamps

12. What temperature should your fridge be kept at?
   - **A.** 10°C
   - **B.** Between 3°C and 5°C
   - **C.** 0°C
   - **D.** 25°C

13. Around 40-50% of household electricity use on what?
   - **A.** Lighting
   - **B.** Charging devices
   - **C.** Laundry and cooking
   - **D.** Heating and cooling

14. If you have high ceilings, what can be used to send the warm air downwards?
   - **A.** Diffusers
   - **B.** A ceiling fan
   - **C.** Windows
   - **D.** Downlights

Thomas Edison (inventor of the incandescent lightbulb) is reported to have said: "I have not failed 10,000 times - I have successfully found 10,000 ways that will not work." - *Smithsonian website*

Classroom Activities

Activity 9: Energy Efficient reflections

INTRODUCTION: Reflect what you have learnt and how you can become more energy efficient. This will help you become more self aware, improve your critical thinking and grow in confidence.

Here are some questions to get started:

1. What is one energy saving habit that I would like to try?
2. Why do I think energy efficency is important for my family and the planet?
3. What do I already do at school or home that saves electricity?
4. When have I noticed electricity being wasted? What could I do about it?
5. How would I explain to a friend or family member why being energy efficient is important?
6. Compare two ways of saving energy. Which one do I think is easier for families to do, and why
7. What do I care most about protecting — nature, animals, clean air, or something else? How can saving energy help that?
8. What makes it hard to remember to save energy sometimes? What could help me do better?
9. What kind of person do I want to be when it comes to looking after the environment? Are my actions matching that goal?
10. If everyone used energy the way you do, would it help or harm the planet? How does that make you feel?

At Home Activities

1. Home energy audit checklist

INTRODUCTION: List all the appliances in your house along with their use.

KITCHEN		LAUNDRY/BATHROOM	
Appliance	Uses	Appliance	Uses
FAMILY ROOM/LOUNGE ROOM		**YOUR BEDROOM**	
Appliance	Uses	Appliance	Uses

At Home Activities

2. Home Energy Improvements

INTRODUCTION: Making small changes can help improve your power bills.

List the changes you can make & the impact it can have on your household energy use.

KITCHEN		LAUNDRY/BATHROOM	
Change	Impact	Change	Impact
FAMILY ROOM/LOUNGE ROOM		**YOUR BEDROOM**	
Change	Impact	Change	Impact

At Home Activities

Activity 3: Rate Your Appliances

INTRODUCTION: The Australian government has developed an Energy Rating Label to help you understand the energy use and running costs of common household appliances.

It gives between 1 & 10 stars to appliances to show how much electricity it uses. Discover the appliances which have energy star ratings and how that affects your power bill.

Steps:

1. Look around! Do some research at home, on a shop website, or visit a store like The Good Guys, Harvey Norman, or Betta Electrical. The Energy Rating Calculator website (https://calculator.energyrating.gov.au/) is also a great resource.
2. Find how many different appliances that have an energy star rating.

On the following page, write down in Table 1 how many stars each appliance has, and what kind of appliance it is.

Most appliances will have a range of star ratings.

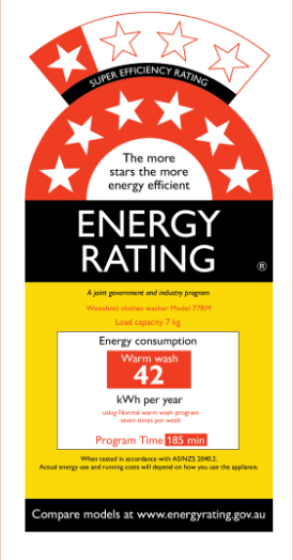
Find the highest and lowest rating and compare them.

For example:

Washing machine Speed Queen 1 star $6983.95

Questions and further research:

1. What are the differences between each appliance?
2. What did you notice about appliances with different star ratings?
3. How might this information affect your decision when buying a new appliance?



The more stars shown on the Energy Rating Label, the less energy the product will use and the more money you will save on your energy bills!

- Energy Rating website

At Home Activities

Activity 3: Rate Your Appliances continued

Fill in the table below & work out the yearly running costs

Table 1: Appliances and Their Energy Ratings

Appliance Name and Brand	Energy Star Rating	Comparisons

Older appliances use more electricity than new ones.

Keeping the fridge/freezer door closed saves electricity and the environment.

At Home Activities

Activity 4: Fantastic Fridges

INTRODUCTION: Refrigerators and reezers use insulation and electric motors to keep your food cold. When you open the door, cold air escapes and warm air rushes in, that makes the motor work harder and uses more electricity.

This activity shows why we should leave the fridge door open for too long.

Remeber to check with an adult before doing this experiment.

Supplies

- Fridge or freezer
- 2 ice cubes
- Two small plates
- A timer or watch
- 2 thermometers (one should measure below -20°C if using a freezer)

Steps:

1. Measure the room temperature and write it down.
2. Measure the fridge or freezer temperature - Place a thermometer inside and close the door. Wait 5 minutes and then record the temperature.
3. Put one ice cube on each plate.
4. Put one plate inside the fridge/feezer, but this time, leave the door open.
5. Put the other plate on the bench as your control.
6. After 5 minutes check
    - The room temperature
    - The fridge/freezer temperature (with the door still open!)
    - How much the ice has melted
7. Repeat your observations in Table 1 on the next page after 10 minutes and again at 15 minutes.

At Home Activities

Activity 4: Fantastic Fridges cont.

Table 1: Change in temperature over time				
Time	Room Temp (°C)	Fridge/Freezer (°C)	Ice cube on bench	Ice Cube in Fridge
0 min				
5 min				
10 min				
15 min				

Questions and Further Research

1. Which ice cube melted the fastest? Why?
2. What happened to the temperature inside the fridge/freezer when the door stayed open?
3. How does this experiment help you think differently about opening the fridge at home?

Optional:

Try it with a different fridge or freezer.

What changes?

Closing the fridge door quickly helps the food inside stay cool.

At Home Activities

Activity 5: Icy Insulation

INTRODUCTION: Insulation slows down the transfer of heat. Wool and foam are great at keeping things cold (or warm), which is why we use them in clothing, lunchboxes, and buildings!

This activity will show you the insulating properties of different materials.

Supplies

- 6 ice cunes (the same size)
- 1 piece of wool (e.g. from an old jumper)
- 1 piece of foam or polystyrene (be careful, it's messy)
- 1 piece of newspaper about 10x10cm
- 1 piece of cling wrap
- 1 piece of cotton (e.g. old tea towel)
- 6 small plates
- A sunny spot

Steps:

1. Wrap ice cubes in each different material. Leave one ice cube unwrapped - this is your control (you'll compare everything to this one).
2. Place all six ice cubes on their own plates and put them in the sun.
3. After 30 minutes, check how much each one has melted.
4. Give each ice cube a score from 1-6
    - 1 = most melted 6 = least melted
5. Check again after another 30 minutes (that's 1 hour total).
6. Write down your results.
    - Which material slowed the ice cube from melting the most?
    - Which one didn't help at all?

Table 1: Insualting Effect of Different Materials

Material	Score after 30 minutes	Score after 60 minutes
Control (no material)		
Cotton		
Wool		
Newspaper		
Cling Wrap		
Foam/Polystyrene		

At Home Activities

Activity 6: Layered Lunchbox

INTRODUCTION: Insulation traps aire to slow down the transfer of heat from outside to inside and vice versa. This activity allows you to create a lunchbox using your knowledge of insulating materials.

Supplies

- A small cardboard box or clean takeaway box
- Ruler and scissors
- Thermometer
- An ice cube in a Ziplock bag
- PVA glue and tape
- Insulating materias such as: Bubble wrap, Foam, Aluminium foil, Newspaper, Wool, Cotton wool, Polystryrene (be careful its messy!)

Steps:

1. Line the inside - Choose your insulating materials and line the inside walls and lid of your box. Try to make it neat!
2. Double up - Add at least two layers of insulation to keep the cold in (or the heat out).
3. Top it off with foil - Cover the top layer of insulation with aluminium foil. This is where your food or ice cube will sit.
4. Put it to the test - Put your ice cube (in the Ziplock bag) inside the lunchbox and close the lid.
5. Check the temperature - Use a thermometer to check the temperature. After 30 minutes, check it again. If it's still cold, your lunchbox is insulated!
6. Decorate your lunchbox - Now make it fun! Use stickers, colours, or anything you like to give your lunchbox a cool look.

Note: This lunchbox is a fun science activity and not for real food use. Some materials (like glue and polystyrene) are not safe for food and can make you sick. Ask a grown up to help you source food-safe materials if you want to make a real lunchbox.

Insulated lunchbags and Eskys keep food cooler for longer.

At Home Activities

Activity 7: Heater Heroes

INTRODUCTION: Heaters use electricity to keep us warm. This activity looks at the difference between heating more than one room. Remember to ask an adult's permission before doing this activity.

Supplies

- Two or more thermometers
- A heater
- Timer or stop watch
- Two or more rooms connected by doors

Steps:

1. Put a thermometer in each room and write down each temperature
2. Turn on the heater in one room and leave the door open
3. After 5 minutes, measure and write down the temperature in each room in Table 1 below
4. Repeat the measurements at 10 minutes, 15 minutes, and 20 minutes
5. Now close the door to the room with the heater
6. Repeate Steps 3 & 4, & record the emperature in Table 2 (next page)

Table 1: Temperature with door open

Time	Room with Heater (°C)	Other Room (°C)	Notes
5 min			
10 min			
15 min			
20 min			

Heaters use more electricity when they warm lots of rooms. To save energy, only heat the room you or your family are in.

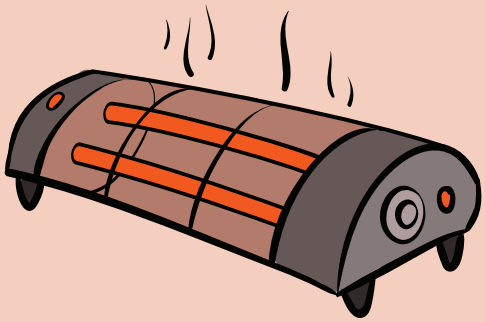
At Home Activities

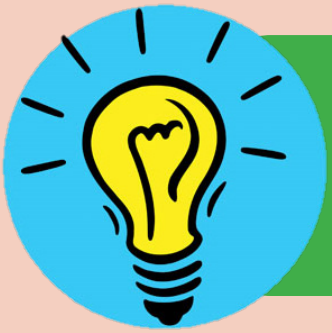
Activity 7: Heater Heroes continued

Table 2: Temperature with Door Closed			
Time	Room with Heater (°C)	Other Room (°C)	Notes
5 min			
10 min			
15 min			
20 min			

Questions and Further Research:

1. What difference in temperatures did you notice when the door was closed?
2. What happened to the temperature in the room with the heater when the door was open?
3. How did the temperature change in the other rooms?
4. What could you do differently next time you use a heater?





Close the door to the room you and your family are heating. You will stay warmer and save money at the same time!

At Home Activities

Activity 8: Look, Hear, Feel

INTRODUCTION: Gaps between doors, windows and floorboards can let the air you are trying to warm/cool escape. Draught proofing is an easy way to keep that air in and reduce power bills. The following activity shows you how to use your senses to hunt down draughts in your house!

Supplies

- All you need for this one is a torch

Steps

1. **Look:** Use a torch to search for any gaps between window frames, floorboards and doors.Can you see any light seeping out from under the door?

   (Hint: Turn off the room's light and complete this activity at night). If light can peak through, then air can escape too.

2. **Hear:** On a windy day, listen for rattling sounds, doors slamming suddenly or whistling/moaning sounds. Wind coming into the house can create different sounds and move windowpanes, curtains and doors.

3. **Feel:** Stand inside near a closed door that leads outside and/or a window. Shut you eyes and concentrate on whether you can feel any air from outside coming in. Any outside air you felt, was a draught.

4. How many draughts did you find?

5. Warning: Internal gas appliances need a certain amount of ventilation, make sure this is maintained!

Why pay for cooling/heating air that you aren't using? Hunt for draughts!

At Home Activities

Activity 9: Draught Proofing

INTRODUCTION: Draught proofing your house means that you aren't paying for heat/cool air that you aren't using. Now you know where the draughts are in your house, partner with an adult and stop those gaps!

Supplies

- Thick black out curtains
- Fabric door snake
- Weather strips and seals
- Rugs or mats
- Acrylic or silicon sealant or caulking

Steps

1. Replace thin curtains with thick black out curtains
2. Place fabric door snakes along doors to stop cold draughts.
3. Place weather strips or seals (with an adult's help) around windows or doors. (If renting always check with your landlord before making any changes)
4. Use rugs or mats on wooden, tiled or laminate floors to keep your feet toasty and warm. Choose rugs that are non-slip to prevent falls.
5. Ask an adult to use a caulking gun and interior sealant to re-cault the edges of thewindow frame where it meets the glass. (If renting, always check with your landlord before making any changes)

For more information on draught proofing, visit your local hardware store or talk to a builder/handyman.

Thermodynamics

Activity 1: Hot Stuff

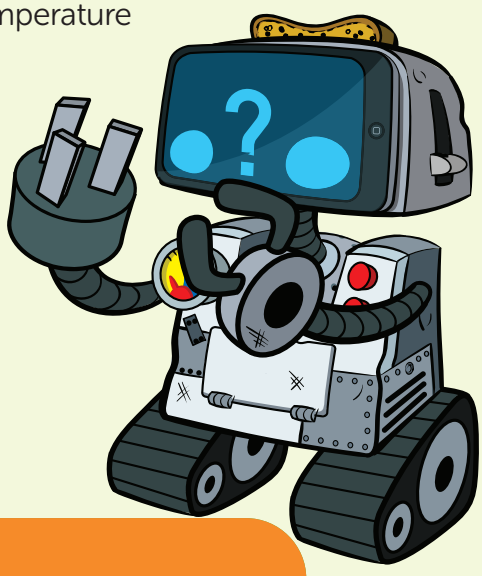
INTRODUCTION: Have you ever picked up a drink and found the mug felt very hot? That's because different transfer heat differently. The below activity shows how important it is choose the right material for your house. (Make sure you do this with an adult).

Supplies

- A drinking glass
- A ceramic cup
- A metal cup (not insulated)
- A plastic cup
- A thermometer
- A measuring jug
- Warm water (Not too hot! You don't want to get burned!)

Steps

1. Check the sizes: Make sure the cups, mug, and glass are all about the same size. If they're too different, the results won't be fair
2. Add warm water: Carefully pour 250ml of warm water into each container. Use a thermometer to measure and write down the starting temperature of the water in each one. They should all start at about the same temperature
3. Wait 5 minutes: After five minutes, check and write down the temperature in each container.
4. Wait another 5 minutes: After another five minutes (so 10 minutes total), check and write down the temperature again.
5. Find the difference: Work out how much the temperature dropped in each container. (Starting temperature – final temperature = heat lost)



Materials like glass and metal lose heat quickly - they let heat move through them easily. We call these thermal conductors.

Thermodynamics

Activity 1: Hot Stuff continued

6. Compare results: Which container lost the most heat? That means its material lets heat pass through easily.

Table 1: Effect of Material on Temperature Change

Material	Initial Temp. (°C)	5 min (°C)	10 min (°C)	Temp. Difference
Glass				
Metal				
Ceramic				
Plastic				

Questions and further research:

1. Compare results: Which container lost the most heat? That means its material lets heat pass through easily.
2. Which container stayed warm the longest?
3. How might this information affect the materials you would use to build a home in Tasmania?

If your house is made with the right materials, it uses less heating and cooling which save electricity and money!

Thermodynamics

Activity 2: Window Watches

INTRODUCTION: Windows lose heat through conduction, convection and radiation. Conduction is where heat transfers through the glass from the warm inside into to the cold outside. Convection is where cold air outside cools the window surface and the warm air near the window moves away, letting the cold air come in. Finally, radiation is where heat from inside the room can spread out through the window. The following activity shows the difference curtains can make when trying to keep the heat inside your house.

Supplies

1. Three thermometers
2. A room with a ground floor window and curtains
3. A stopwatch or timer

Steps

1. Outside - Put one thermometer outside near the window
2. Next the window - Put one thermometer right next to the window inside (it can touch the glass). Close the curtains.
3. In the room - Put one thermometer on the opposite side of the room, away from the window.
4. Start measuring - Write down the temperature from each thermometer in Table 1.
5. Keep measuring - Every 10 minutes, measure and record the temperatures. Do this for 40 minutes.
6. Repeat steps 1-5, but don't close the curtains this time.
7. Record your results in Table 2

Questions and further research:

1. Which temperature changed the most?
2. What is the difference in temperature between next to the window and the opposite of the room?
3. Why did the temperature change inside the room?
4. What do you think happens to the temperature inside your room if you keep the curtains open during the winter?

When you close the curtains, your heater or airconditioner doesn't use as much energy.

Thermodynamics

Activity 2: Window Watches continued

Table 1: Change in Temperature with the Curtains Closed

Location	Initial Temp (°C)	10 min (°C)	20 min (°C)	30 min (°C)	40 min (°C)	Change in Temp. (°C)
Outside						
Window						
Inside						

Table 2: Change in Temperature with the Curtains Open

Location	Initial Temp (°C)	10 min (°C)	20 min (°C)	30 min (°C)	40 min (°C)	Change in Temp (°C)
Outside						
Window						
Inside						

Doubled glazed windows are made with two layers of glass, instead of one. They are very energy efficient and can reduce heat loss or heat gain by almost 30% compared to single-glazed windows. - *Sustainability Victoria website*

Thermodynamics

Activity 3: Solar Ovens

INTRODUCTION: Did you know that some people cook food without using electricity? They use the sun and build solar ovens. Solar cookers are often used in areas without reliable power sources such as Kenya, India, and Bolivia. These ovens come in different forms, but they all used reflective materials to direct the sun's rays onto a cooking pot.

Using what you have learnt about thermodynamics, design, build and test your own solar oven. (Remember that it is not food grade and unsuitable to actually cook food).

Supplies

- A small cardboard box or clean takeaway box
- Ruler and scissors
- Thermometer
- Chocolate (to place in oven)
- PVA glue and tape
- Reflective and insulating materias such as: Paddle pop sticks/straws, Bubble wrap, Black papaer, Foam, Aluminium foil, Newspaper, Wool, Cotton wool, Polystryrene (be careful its messy!)

Steps:

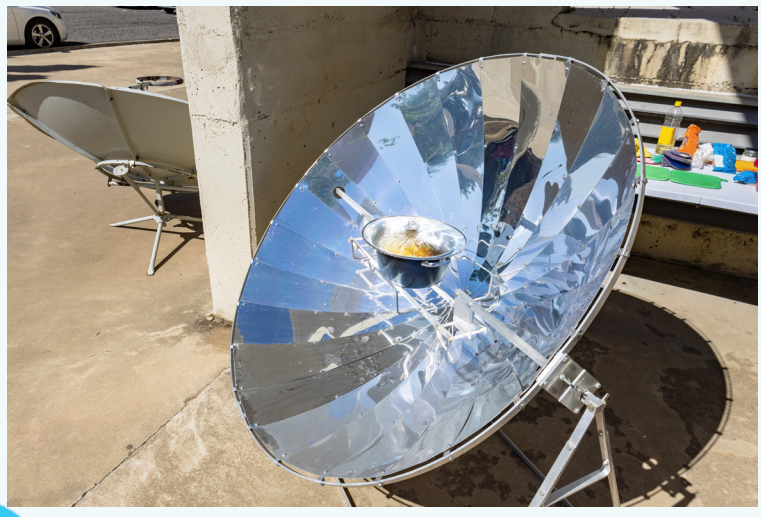
1. Design your solar oven on a piece of paper. Think about how to angle the sun's rays to a central point where the food would cook.
2. Choose your materials. Think about which materials are reflective and which are insulating. What combination do you need?
3. Build your solar oven using the supplies you have chosen. Allow to dry before testing.
4. Test the solar oven. Choose a hot day and place the box in the sun. Put the chocolate where the cooking pot would go. Record the temperatures over a 30 minute period in the table on the next page. What happens to the chocolate?
5. Repeat Step 4 in the shade and compare the results. What do you notice? How is it different?

Solar Cookers International estimate that there are more than 4.8 million cookers being used around the world!

Thermodynamics

Activity 3: Solar Ovens

Table 1: Change in temperature over time			
Time	Temperature in the sun	Temperature in the shade	Observations
0 min			
5 min			
10 min			
15 min			
20 min			
25 min			
30 min			



21.7 million people worldwide are directly impact by solar cooking (that's the equivalent as 80% of Australia's population!) - *SCI website*

Energy Retailers

Activity 1: Power to Choose

INTRODUCTION: Tasmania has different electricity retailers because it gives people choices about who they want to buy their electricity from—just like choosing which shop to buy your snacks from!
These electricity retailers all buy power (like from the wind, water, or sun) and then sell it to homes and businesses. When there are different companies, they can offer better prices or special deals, and people can pick the one that works best for them.

Steps:

1. Visit the Australian Government website: www.energymadeeasy.gov.au and enter your postcode or the postcode of the nearest town.

2. Follow the prompts:

   a. What do you want to compare? Choose electricity.

   b. Do you want to compare plans for your home or your small business? Choose 'Plans for my home'.

   c. Why are you comparing electricity plans? Choose 'I am moving to a new home' (Feel free to select the other option if you have access to your most recent electricity bill).

   d. What company provides your electricity now? Choose 'Not sure/Not in this list' from the drop down menu.

   e. Which best describes how much electricity you use? Choose the option that matches your home

   f. Select all the 'Electricity plan results' and compare the different pricing options.

   g. Fill the below table in and answer the questions. The first line has been completed as an example.

   h. Which company has the lowest supply charge (the cost of providing the electricity)? Which is the highest?

   i. Which company has the lowest usage charge (the cost of the electricity you use)? Which is the highest?

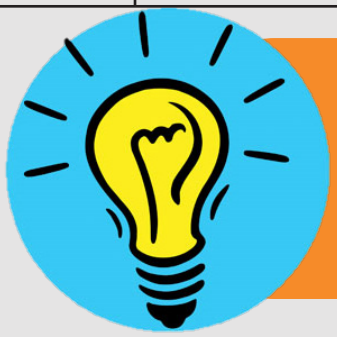
   j. Is there a difference between 'Time of Use' and 'Single rate' supply and usages charges?

The Tasmanian Economic Regulator is an independent body that makes sure energy companies have fair prices and reliable services.

Energy Retailers

Activity 1: Power to Choose continued

Energy Company	Type	Supply Charge (c/ day)	Usage Charge (c/ kWh)	Annual estimated cost ($)	Score (where 1= cheapest total cost)
example: *SuperSavers*	*Time of Use*	*148.17*	*16.00-34.77*	*2,990.00*	*3*



Having different electricity companies mean families can find the best value for money.

Energy Retailers

Activity 2: Bossing Your Bill

INTRODUCTION: Now you've researched the different energy companies, let's learn how to boss your bill by making smart choices.

Steps:

1. Photocopy or print a recent electricity bill or download a sample from one of the energy providers identified in the previous activity (Power to Choose)
2. Using the copy of the power bill, find and highlight the key components listed in Table 1 on the following page.
3. Fill in Table 1 with the values found on your power bill.

Questions and further research

1. How does the total amount due on your bill compare to other houses in your neighbourhood? What about to your last bill?
2. How much of your power bill is supply charges?

   For example: *Supply charge - $34.07*

   Total due - $116.12

   Percentage of total due: 34.07 ÷ 116.12 = 0.2934 x 100 = 29.34%

   The supply charge makes up 29.34% of the bill.
3. Using the same equations, calculate how much of your power bill is usage/energy charges, i.e. how much electricity you used.

Understanding your power bill means you can track changes in your energy usage.

Energy Retailers

Activity 2: Bossing Your Bill continued

Table 1: Main Features of a Power Bill

Component	What is it?	Value on Bill
Account Summary	*What you owe and when it's due.*	
Billing Period	*The time the bill covers, usually between 1 and 3 months.*	
Meter Reading	*How much energy you used.*	
Usage/Energy Charges	*The cost of electricity you used in kilowatt hours (kWh).*	
Supply Charges	*The daily fee for being connected to the energy grid.*	
Tariff Type	*Pricing plan you're on.*	
Total Amount Due	*Full amount you need to pay for the electricity you have used, minus any money you have already paid.*	
Usage Comparison	*Shows how much electricity you used compared to other households and/or previous bills.*	
National Meter Identifier (NMI)	*The special number used to identify the exact location of where the electricity is used, such as your house. Every address has a different NMI.*	

The Australian Energy Regulator (AER) makes sure that energy – like electricity and gas – is provided fairly and safely in Australia. They follow special rules to help keep everything working properly.

Energy Retailers

Activity 3:Tackling Tariffs

INTRODUCTION: We all use electricity at different times during the day, such as when we turn on the lights, use the oven, or watch TV. Sometimes, lots of people use electricity at the same time, like in the morning before school or in the evening at dinner time. These busy times are called peak times. Other times, when fewer people are using electricity, are called off-peak times. *Table 1* below shows the differences in energy use throughout the day. To make sure everyone gets the electricity they need, we have a system of power poles and wires (called the electricity network) that sends power to homes and schools. Electricity companies sometimes use something called a *Time of Use Tariff*. This means that electricity can cost more at peak times (when lots of people are using it) and less at off-peak times (when fewer people are using it). You can choose when to use certain appliances to save money. For example:

1. Run the dishwasher at night
2. Set the washing machine to start early in the morning.
3. Turn off heaters and lights when you don't need them.

Supplies

1. The latest factsheet on possible electricity tariffs for your state (can usually be found through a quick online search).

Steps

1. Using the information from the tariff factsheet, fill in *Table 1* below.

Table 1: Available Tariffs

Tariff Type	Daily Service Charge	Peak Period Cost	Peak Period Times	Off peak cost	Off peak time
example:					

Tariffs are designed to give more control over energy use to the customer

Energy Retailers

Activity 3: Tackling Tariffs continued

2. In the next table compare the cost of running a washing machine (0.7 kWh per load), heater (1.8kWh per hour) and fridge (0.1kWh per hour) with a total of 2.6kWh for the different during the different time periods.

Table 2: Difference of Tariff prices over 24 hours

Tariff Type	Price at 7am	Price at 12pm	Price at 7pm	Price at 12am	Total price difference
example: *TAS 93*	*=cost of energy usage x 2.6kWh* *=17.229 x 2.6= 44.80 cents*	*= 3.618 cents x 2.6 kWh* *= 9.41 cents*	*= 17.229 cents x 2.6 kWh* *= 44.80 cents*	*= 3.618 cents x 2.6 kWh* *= 9.41 cents*	*= highest price - lowest price* *= 44.80 cents - 9.41 cents* *= 35.39 cents*

Questions and further research:

1. Which tariff is the cheapest overall?
2. What did you notice about the cost of using appliances at different times of the day and under different tariffs?
3. How does this information change the way you use electricity?

Using power during off-peak times helps save money and keeps our electricity network running smoothly.

Glossary

Appliance:	A device, machine, or piece of equipment, especially an electrical one that is used in the house, such as a cooker or washing machine.
Atom:	The smallest unit of any chemical element, consisting of a positive nucleus surrounded by negative electrons. Atoms can combine to form a molecule.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
Circuit:	A complete path through which an electric current can flow.
Conduct:	To allow electricity or heat to go through.
Conductor:	A substance that allows electricity to go through it.
Electricity:	The flow of electrical power or charge. A secondary energy source that we get from the conversion of other sources of natural energy like water, natural gas and coal, which are called primary sources.
Electrified:	When an object becomes charged with electricity when it was not before, e.g. if a fallen powerline comes into contact with an object like a car, the car will become live with electricity.
Electrocution:	When electricity is sent through someone's body, causing death.
Electron:	The basic particle that orbits the nucleus of an atom. It can be stimulated to movement by various forces like magnetism and has a negative charge.
Energy:	The capacity to do work, or vigorous activity fuelled by various sources.
Excavator:	A large, powerful machine with a container connected to a long arm, used for digging up the ground.
Frayed:	In the case of electrical leads, it is when the insulating threads or plastic coating comes loose.
Hazard:	Something that is dangerous and likely to cause damage.

Ignite:	To (cause to) start burning.
Incident:	An event that is either unpleasant or unusual.
Infrastructure:	The basic systems and services, such as power supplies, that a country or organization uses in order to work effectively.
Irrigation Pipes:	Pipes that supply the land with water.
Molecule:	A particle made up of two or more atoms that are chemically bonded together.
Passive House	A design standard, developed in Germany, that creates healthy, comfortable and very energy efficient buildings. It is also known as 'passivhaus'.
Power Board:	A portable device consisting of a plug, power cord and one or more rows of electrical sockets, allowing multiple electrical devices to be powered from a single electrical socket.
Power Point:	A socket in a wall for connecting a device to an electricity supply.
Power Station:	A factory where electricity is produced.
Powerline:	A cable carrying electrical power, especially one supported by pylons or poles.
Powerline:	A structure used in electric power transmission and distribution to transmit electrical energy across large distances.
Practices:	The act of doing something regularly or repeatedly to improve your skill at doing it.
Substation:	A place where high-voltage electricity from power stations is converted to lower-voltage electricity for homes and businesses.
Thermodynamics	A type of science looking at how heat, work, temperature and energy relate together.
Transmission Tower	A tall structure, usually a steel lattice tower, used to support an overhead powerline. Also called a Power Tower.
Voltage:	The force of an electric current, measured in volts.

Energy efficiency quiz answers: 1. *True*, 2. *B*, 3. *True*, 4. *D*, 5. *B*, 6. *C*, 7. *D*, 8. *C*, 9. *B*, 10. *B*, 11. *B,* 12.*B,* 13. *True*

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