TUNE UP

This module aims to guide Energy Educators through the Home Energy Tune Up process.

To be read with Home Energy Tune Up slides and Tune Up checklist.

1. Outline

- Meters and bills
- Home exterior
  - Roof
  - Foundation
  - Draught, shading and ventilation
  - Insulation
  - Plumbing
  - Hot water
  - Space heating/cooling
- Home interior
  - Space heating/cooling
  - Kitchen
  - Bathrooms
  - Laundry
  - Electronics
- Lighting

2. Introduction

Our homes are complex systems, and to take you through it in a systematic way we have created some categories and given it a sequence. The checklist and slides are ordered with the meters and bills coming first, followed by the exterior of the home, and then the interior, but the Tune Up can be ordered in any way that's most convenient.

Of course, there are multiple barriers to implementing any and all of the measures provided here. We hope that everyone can find something they can do in this checklist. The important thing is to start somewhere and keep going. An energy efficient, healthy, comfortable and affordable home is, for most of us, a journey, not a destination.

3. Meters and bills

3.1 Meters

Each one of the companies that serves this home should have an explanation that describes how to read their meters. This is a good thing to know if the retailer estimates your bill for some reason or another: you can check to see if their estimate is accurate.

Learn how to read your meter in module 3. A household resource on reading a meter will be coming soon.

Meter locations:

- Gas meters are usually located on the perimeter of the home, accessible from the street.
- Water meters are usually on the verge, close to the property line perpendicular to the street.
- Electric meters are close to or inside your electrical box/ switchboard

3.2 Analyse your bill

This is all about patterns.

Your baseline consumption is likely driven by appliances that you don't turn off or use every day:

- Hot water system
- Fridge
- Cooking appliances
- TV

On your electricity bill, the 3 months that have the lowest amount of consumption could give you a good idea of how much your baseline consumption is.

Of all of them all, hot water is likely to be the biggest item in terms of energy consumption.

If you have gas for hot water and cooking, hot water is also the biggest item in terms of energy consumption.

On your electricity bill, note the winter months (June July, August), summer (December, January, and February).

It is likely that every kWh above the baseline consumption is either heating in the winter, or cooling in the summer.

Use the example in the following slides to estimate how much energy is consumed in your house for heating, cooling and for your baseline.

4. Home exterior

4.1 Roof

If you are walking up to the front door, have a look at the roof.

Another way to see what's on your roof is using Satellite view in Google maps.

What is the roof material? Is it Colourbond steel, original corrugated steel, terracotta or concrete tile, asbestos?

Roof colour matters a great deal, particularly in hot climates. A dark roof means that your home gets significantly hotter. Keep in mind that dirt, debris, and rust may also darken your roof.

More information on roof colour and their impacts: https://renew.org.au/renew-magazine/building-materials/its-not-all-black-and-white-why-roof-colour-matters/

Roof ventilation is important to release heat, but mostly to release moisture. If your ceiling is mouldy it might be because moisture is building up in your roof cavity.

Leaks are bad. They can lead to water damage inside your home, but also inside the roof cavity leading to insulation and ceiling mould, and electrical faults.

4.2 Foundation

Is the floor of your house on piers or stumps (timber, steel or concrete)? Or is it directly on a concrete foundation at ground level?

There are advantages and disadvantages to each of these foundation designs. If you have a home with brick cladding, look around the house, low on the outside walls. You might find vent blocks low on the wall. This tells you that the house is built on piers and not directly on the ground. The house in the slides with the red roof, is this type of house. Look directly below the window by the driveway. You can clearly see the vents in the brick wall. In this type of house, the space under the house is much more confined.

Draughts, shading and passive ventilation

This is about identifying draught, shading and how well your doors, windows, and floors operate.

Poor condition of doors and windows is the greatest contributor to home draughtiness. Draught is bad because it means:

- Less comfort
- More energy spent to cool you home in summer

- More energy spent to heat your home in winter
- If it is smoky or smelly outside, you can't keep it out

It makes your home less comfortable and more expensive to operate.

How many doors and windows need weatherstripping applied?

When thinking about windows, we may immediately think about double glazing but there are many other measures that are very impactful such as shading, screens and draughtproofing.

Floor gaps between floorboards or along walls and threshold are particularly common in older homes. This causes draught. In the same way that fixing draughts around doors and windows is important, so it is for your floor.

Keep in mind that gaps mean that air can go in and out; so can pests and water.

In many situations, these changes can be done if you rent and/or have limited funds. Fixing draughts is the cheapest thing to do and it can make a significant difference. In many older homes, the summer heat gain due to draughts might be between 5 and 25% through draught.

Doors draughtproofing video | Windows draughtproofing video

Everything about airtightness: https://www.youtube.com/watch?v=5kKkDGatZsE

4.3 Insulation

Find your ceiling hatch. Do you have a stable, load-appropriate ladder that you can use to reach this? You don't have to get up there, just be able to open the hatch. If you have a selfie stick this is even easier. Use it to take pictures of your ceiling space. Answer these questions:

1. Is there any insulation?
2. How thick is it?
3. How complete is the coverage?
4. Any mould or damage

Elevated floors can be insulated. If there are gaps in your floors, every water spill on your floor might mean that the insulation is exposed to moisture and may lead to mould.

Recommended levels of insulation in Queensland vary with climate. Roughly speaking, regional SEQ can get quite cold in winter and FNQ can get quite warm in summer. If your home has no insulation at all, then the most important one to start with is ceiling insulation.

Recommended insulation levels in the ceiling space do vary but a good number to strive for is about R5.

To reach this level, it requires between 200 and 220mm of insulation (rockwool, fiberglass, cellulose, etc). Look for exact numbers if you choose to add insulation to your home.

If you can inspect your ceiling space, you'll often find little to no insulation. You can estimate by looking at the timber beams on the floor of your ceiling space. They are typically 100mm deep. If your insulation does not fully cover this depth, you have less than half of the insulation that you need. 200mm will completely cover the timber beams.

4.4 Outdoor Plumbing

Calculating the following examples with water rates at $3.44/kl, a cold-water leak at one drop per second, costs about $5.50/yr, or two drops per second is about $11.00/yr.

As the age of plumbing increases, it's easy to imagine a home with two outside leaky taps at 2 drops per second.

Many of these leaky taps can be fixed with basic tools and a helpful YouTube video.

Beyond taps, pools and rainwater tanks also use water and electricity. If there is a leak on a line connected to a water pump, this might waste both water and electricity.

4.5 Hot water

A long-term goal would be to eventually upgrade to a hot water heat pump or passive solar water heater, both backed up by rooftop solar. These are the most cost-effective choices when you combine purchase price plus operating costs.

The price of gas, plus the customer charge and the efficiency of the gas hot water combined, make electrification a better choice. Electrification of your hot water system significantly reduces the energy needed, in turn reducing your energy bills.

A simple electric resistance water heater can be a good choice if you need/want to get off gas, however heat pumps give you the most gains.

Lagging insulation on the hot and cold water pipes is a standard practice and means that you lose less heat.

However, if you rent, or do not have access to money for such an upgrade, there are still things you can do to save money with your hot water consumption. See 'home interior' section.

4.6 Space Heating and Cooling (exterior details)

If your building envelope is energy efficient, less energy needs to be consumed by smaller heating and cooling systems. Unfortunately, the opposite is also very true.

Reverse cycle air conditioners (RCAC) are also known as heat pumps. Just like air conditioners, these devices use electrical energy to move heat from one place to another.

Some units will have a sticker with their energy star ratings. For the ones that don't, note the model and serial number from the name plate and use this website to find their rating for your climate. https://calculator.energyrating.gov.au/

Are you buying an appliance soon? How star rating matters: household resource coming soon

If there is no energy star rating sticker, look at the nameplate data. Find the numbers associated with EER and COP. If these are in the 3.5 to 4 range it represents average, up to date efficiency. The best efficiency numbers can range between 5.7 to 6.5.

5. Interior

At this point our energy Tune Up moves to the interior portion of the home. Several functional areas have counterparts in both exterior and interior, such as: air conditioners, plumbing and lighting. When you are investigating these, and other areas, keep thinking of how the different “parts” of your home act together.

5.1 Space Heating and Cooling (interior details)

Maintenance of your air conditioning equipment is critical to achieve the lowest cost of operation. See if you can find a company or YouTube video that explains in detail, how you can keep your filters clean.

If you don’t have a manual for your air conditioner, see if you can find one online. Many air conditioners have a “drying” mode that acts like a whole house dehumidifier, removing excess moisture from the air. During rainy months the humidity is very high, but the temperature is not too bad. Using an appropriate drying function can result in a more comfortable home and a lower utility bill.

Keep the filters clean. Check them often!

Manufacturers provide cleaning instructions:

Example: Mitsubishi, sells a cleaning kit:
https://www.youtube.com/watch?v=UXv8pKiMWvQ

5.1.1 No-cost, Low-cost Savings

Use fans to feel cooler. The air moving against your skin evaporates your sweat to make you feel much cooler. You can typically set an air conditioner three to four degrees warmer to save on cooling costs.

How to keep cool without breaking the bank: household resource coming soon

An example of adjusting air conditioner temperatures slowly:

Give your body time to acclimatise to any changes. During hot months, wait for a hot day when the whole family will be outside. As you leave the house, bump the thermostat up 0.5 °C. Wait a week and do it again. Make sure to have fans available to move the air and make everybody feel cooler. By the end of the second season, you’ll be at 25 °C and saving lots of money and it didn’t cost you a thing!

5.2 Kitchen

Quality faucet aerators help to save water every time you use the kitchen sink. Saving hot water saves not only the water, but the energy to heat it up also.

Video to show how to replace aerators: How to Replace a Faucet Aerator | Repair and Replace

5.2.1 Major Appliances

How many appliances with energy and/or water labels do you use in your kitchen?

When buying new appliances always check the energy labels. Consumption for appliances is listed as kWh/yr.

If your current appliances don't have the energy star rating anymore, use nameplate details and https://calculator.energyrating.gov.au/ to find the star rating.

Set refrigerator temperatures for food safety concerns: Refrigerator 2 to 5ºC, Freezer -11 to -23ºC.

Keep your refrigerator and freezer full. If you have some empty space, cool down a couple of jugs of water!

Always run dishwashers with a full load.

Dishwashers have water use labels, too. Make sure to consider water consumption when you replace these items.

Appliance energy labels can be found at: https://www.energy.gov.au/households/appliances

Explanation of water labels: https://www.energy.gov.au/households/water-efficiency

How to replace fridge seal: How to replace your fridge freezer door seal | by Hotpoint

5.2.2 Minor Appliances

Many small appliances allow you to save energy by using the right one for a particular task. Reheating leftovers in a toaster oven takes less energy than heating up your main oven. This is also helpful on hot days because less energy means less heat goes into your kitchen.

5.3 Bathroom

Low flow showerheads and/or shorter showers.

Low flow aerator for bathroom sink.

Everyone's utility bill is directly related to the length of the showers that you and your family take. Try to get everyone to shorten their shower time.

Fix all leaks, especially any hot water leaks!

Leaks can really add up.

Calculating the following examples with water rates at $3.44/kl and energy rates at $0.09/MJ (delivered, including efficiency), a cold-water leak at one drop per second, costs about $5.50/yr, or two drops per second is about $11.00/yr.

A similar leak on a hot water line costs about $28.50/yr, or two drops per second is about $57.00/yr

As the age of plumbing increases, it's easy to imagine a home with two outside leaky taps at 2 drops per second, and a similar situation inside with bathroom and kitchen sinks. If you add one leaky hot water tap to this scenario, the annual waste for leaking taps in this home might cost $100/yr!

Many of these leaky taps can be fixed with basic tools and a helpful YouTube video.

5.4 Laundry

Washing machines and dryers have star ratings, reach for the stars!

Wash clothes in cold water.

Always run clothes washers and dryers with a full load.

Line dry your clothes whenever possible: the sun and wind are your no-cost dryer!

Washing machines have water use labels, too. Make sure to consider water consumption when you replace these items.

Appliance energy labels can be found at: https://www.energy.gov.au/households/appliances

Water Consumption - Explanation of Water labels:
https://www.energy.gov.au/households/water-efficiency

5.5 Electronics and Phantom Loads

Simple solution: plug all devices into a power board and turn it off when not in use.
Turn your toaster off at the wall switch.

Lighting and phantom loads can add up to more than 10% of your electricity bill now and we can reduce that to just a few percent over time and with limited budget.

Remember that many small electronic appliances have energy rating labels.
Before replacement or first purchase, make sure to buy the most efficient model that meets your needs.

More info on phantoms and power strips:
https://www.energy.gov/energysaver/articles/save-energy-your-household-smart-power-strip

https://www.nrel.gov/docs/fy14osti/60461.pdf

6. Lighting

Look at the wattage of each light, especially the halogen lamps. They are sold as being more efficient than incandescent lamps, and they are, but not by much.

Average lumen productions (the amount of light given off): Incandescent lamps produce 13 lumens per Watt, compact fluorescent lamps produce about 50 lumens per Watt, and LED's produce about 100 lumens per Watt. LEDs are twice as efficient as compact fluorescent lamps. In addition, LEDs contain no mercury and last 2 to 5 times as long.

For renters and people on tight budgets, LED lamps are a good thing to replace because we can do so, one lamp at a time. And if we save the old lamps in a closet somewhere, we can take the LEDs with us when we move!

Survey all the lights in your house and look at LED options. Pick one light that you would like to upgrade…and then do it!

7. Summary of Solutions

Solutions may vary quite significantly depending on situations.

Things to keep in mind:

The building envelope separates us from the environment and allows us to create a space that should be more comfortable and affordable to maintain. The key issues that defines the cost of that comfort are:

- insulation,
- window construction and placement,

- and how draughty, or leaky, the building envelope is constructed.

Heating (yes, much of Queensland has a winter) and cooling the living space typically causes the largest portion of your utility bill and has the largest direct effect on comfort.

Production of hot water for showers, dishwashing, etc., generally is the second largest energy use in a home. Many homes still have no air conditioning, or households can't afford to operate them. In this case, the production of hot water can be the largest single expense in our utility bills.

In the past, refrigeration for our food and medicines has been a more significant energy consumer. With the advent of new, energy efficient models, refrigerators will move lower on the list of household energy consumption.

In each home there is a broad category of appliances, both major and minor. Stoves, ovens, clothes washers, dish washers, rice cookers, air fryers, microwaves, laptop computers, Wi-Fi routers, and the list goes on. Some of the items on this list use a significant amount of power when they are on (think about an electric stove top), but you might use this for part of an hour each day, or less. On the other end, there might be a Wi-Fi router that is on 24/7.

8. Reflection on learnings

1. What should you do to keep cool the ‘energy efficient way’, at home? Order the following options:
    - Get the breeze going
    - Air condition setting 24 to 27oC
    - Shade windows
    - Air condition on Dry mode

Hint: Let’s do the things that don’t require electricity first.

2. What kind of light bulb should you buy from now on?
    - Halogen
    - CFL
    - LED
    - Incandescent
3. Name 5 things renters can do to make their home more energy efficient, improve comfort or reduce their bills. They can be behaviour in the home or physical improvements to the home.
4. Go through the Tune Up Audit Checklist for your own home.
    - What actions will you take short term?
    - What would the journey beyond that look like?

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