

Sustainable renovations

A handy checklist!



Check out our handy checklist of changes you can make to improve the energy efficiency of your home.

Whether you're planning a major renovation or a small extension - we've got you covered.

Source: [Renovations and additions | YourHome](#)

PASSIVE DESIGN

- Locate living areas to the north of your floorplan design, with windows facing north.
- Locate low occupancy spaces like bathrooms, bedrooms, garages, and hallways, to the south of your floorplan design.
- Limit the number and size of windows facing south and west.
- Design eave and pergola shading on the northern façade to passively block out the harsh summer sun but allow access to the winter sun.
- Select operable shading systems on the east and west facades, such as awnings, louvers, sliding shutters, venetian or roller blinds. Also consider deciduous trees or climbers to shade your windows in summer and allow the sun through in winter.
- Locate operable windows on opposite sides of rooms, to create natural ventilation pathways.

ENERGY EFFICIENCY

- Install insulation in your walls, floor and roof to help keep your home warm in winter and cool in summer.
- Select high performance double glazed or triple glazed windows to improve the thermal efficiency of the home. Select timber, uPVC frames or thermally broken metal frames, to minimise heat transfer through the frame.
- Install internal window dressings such as curtains or blinds to prevent the transfer of heat from the room to the window, and thus outside, during winter.
- Design and construct an airtight renovation through proper sealing of internal walls and ceilings as well as external gaps like pipework or ducts.
- Install LED lights which use approximately 80% less electricity than the alternatives.
- Look for and include low embodied carbon materials in the design of your renovation.

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ELECTRIFICATION

- Install an efficient electric heat pump hot water system, which can be 3–5 times more efficient than the alternative options.
- Install reverse-cycle air conditioning systems to provide heating and cooling to the home. Select within 1 Star of the best available system on the market.
- Install an electric induction cooktop.
- Power your home with renewable energy by installing solar PV panels. Consider purchasing a battery to store any energy generated but not used during the day.
- Purchase **GreenPower** to supply your all-electric home with 100% renewable energy.
- Design your garage/parking area to be electric vehicle (EV) ready by installing infrastructure to support future EV charging.
- Purchase an electric vehicle or e-bike that can be charged on clean renewable energy.

URBAN COOLING AND WATER SENSITIVE URBAN DESIGN

- Select light coloured roofing materials to radiate away up to 75% of solar energy and reduce the urban heat island effect.
- Select light coloured external building materials.
- Design and plant grass and vegetation instead of hard surface materials like concrete, tiles and bricks. Use permeable paving solutions where a structured surface is needed (such as for your driveway).
- Design and plant trees and vegetation around your building, or install green infrastructure (such as green walls, green roofs and raingardens) to provide natural cooling to your garden and home. Consider using indigenous plant species to support **Kingston's wildlife**.
- Design new roof areas to direct rainwater towards a centrally located rainwater tank that can be connected to irrigation systems, toilets and laundries (if included in the renovation areas).

Professional Advice

Always seek professional advice for electrical and gas system repairs, modifications, and upgrades. For help deciding what to prioritise, get a **Residential Efficiency Scorecard** assessment completed to assess the current efficiency of your home and make recommendations for improvements. You can use your score to help sell your house as an energy efficient home!

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RENOVATION DESIGN

Sustainable design decisions have the greatest impact, and least cost, when considered at the earliest stages of the design.

For renovation and new builds, it's important to incorporate **passive design principles** into your design early on. Passive design refers to designing in a way that responds to, and works with, the local climate and seasons to maintain a comfortable temperature in the home whilst reducing the need to use heating or cooling systems.

When designed correctly, factors such as orientation, thermal mass, insulation and glazing work together to achieve passive design outcomes.

Some initial tips for integrating passive design principles into your renovations include:

- Orientation: Locate high occupancy rooms such as living rooms on the northern side of the home (rather than bedrooms, laundries, garages). Northern aspect rooms benefit from the most access to sun and daylight, which can passively heat the space during winter and make the space more comfortable to be in.
- Orientation: Minimise window size on south and west sides of the home. Windows on the south will receive no direct sun exposure leading to heat loss, and windows on the west will receive very high sun exposure, leading to very hot rooms in summer.
- Shading: Provide horizontal shading, like eaves and pergolas, to windows on the northern side, which block the harsh summer sun, but allow the winter sun in.
- Shading: Provide operable vertical shading, like blinds and shutters, to east and west facing windows
- Shading: Deciduous vegetation can be used to shade windows in summer and allow sunlight into your home in winter
- Glazing: Provide double or triple glazed thermally broken aluminium windows or uPVC double or triple glazed windows.
- Ventilation: Provide openable windows on opposite sides of a room to create natural ventilation pathways
- **Thermal mass:** In winter, thermal mass can absorb heat during the day from direct sunlight which is then re-radiated back into the home throughout the night. In summer, provided the sun is blocked from reaching the mass, it keeps the house cool by drawing warmth from inside.

Research how passive design principles can be incorporated into your project and include a home energy assessor early in the design for expert guidance. When it is time to start your project, get assurances from your builder or designer that they have experience in the area. Also see **YourHome** and **buyers guide to shading** for further information.

ENERGY EFFICIENCY

Insulation

Insulation helps keep your house cool in summer and warm in winter by providing a protective barrier between the outside climate and the indoor climate.

Insulation should be considered for your floor, walls and roof.

Ensure the installer is aware of your expectations that you do not want any gaps between insulation batts, as this can drastically reduce the effectiveness of the insulation.

For further information, check out Renew's **Insulation Buyers Guide**. Also see **guide** to how it should be properly installed.

Windows

Up to 40% of a home's heating energy can be lost and up to 87% of its heat gained through windows. Most older houses were built with single glazed windows, which are not very efficient when it comes to heat loss or gain.

We recommend selecting double or triple glazed windows, and opting for a timber, uPVC or thermally broken metal frame.

The 'best' windows for your home can depend on orientation, shading and the space they are serving. We recommend discussing window options with an energy assessor, as they can determine which combination of glazing and frame type will provide the best performance in your home. See window buyers guide for more information **here**.

Window dressings such as curtains and blinds are very effective at limiting heat loss and gain when closed (and installed correctly).

For best effect, curtains should be heavy, touch the walls on each side of the window, reach to the floor, and have an enclosed pelmet at the top.

Blinds should be custom designed to ensure they fit snugly within the window frame to reduce air gaps around the edges. The most effective style for thermal efficiency is a honeycomb blind, which is made from fused layers of fabric that form a series of hexagon-shaped tubes when open.

See **buyers guide for high performance curtains** for more detail.

Lighting

An LED bulb uses approximately 80% less electricity to produce the same amount of light than a halogen bulb does.

Install IC-4 rated (fire rated) LED light fittings, which allow insulation to be installed over them and improve the efficiency of the insulation. See Sustainability Victoria's website for information on lighting **here**.

Low embodied carbon materials

Embodied carbon refers to the carbon emissions used to produce a material or product, including mining, manufacture and transport.

The embodied carbon in a building typically accounts for 15%-25% of a buildings total carbon emissions after 30 years of operation.

See **YourHome** and **Renew** for more information on sustainable selection of materials.

<https://www.yourhome.gov.au/materials>

Airtightness

Uncontrolled air leakage allows hot air in during summer and cold air in during winter and can account for 15 – 25% of heat loss in Australian homes. Common air leaks in new builds are found at:

- The junction of walls, floors and ceilings.
- Bulkheads, including on top of cabinetry.
- Ducted heating and cooling return air cavities.
- Around window and doors frames.
- Plumbing penetrations.
- Down lights, exhaust fans and manholes.

See Sustainability Victoria's video covering best practice for air tightness and insulation installation **here**.

ELECTRIFICATION

Join the clean energy future and make your home all-electric. Installing all electric appliances has many benefits, including cost savings, improved health and wellbeing and the potential to power your home entirely by renewable energy sources.

Appliances

Selecting efficient and all-electric appliances will improve the energy efficiency of your home and lead to energy and cost savings. Most large appliances have an operating life of 10 years or greater, so the efficiency of the products we select is one of the easiest decisions we can make to influence our personal energy use.

See energy rating website and appliance buyers guide for more information.

energyrating.gov.au

renew.org.au

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Hot Water

Hot water systems are the second highest user of energy in Australian homes. Installing an electric heat pump hot water system is the best option, as this system type is 3-5 times more efficient than the alternatives and can be powered by renewable energy.

Look for systems with control options that allow you to select the time of day that the system heats the water. This will allow you to utilise solar PV system to heat the water during the day or to run the system during off-peak times to save money (if they have off-peak electricity tariff). See hot water buyers guide for more information [here](#).

Heating and Cooling

Select energy efficient reverse cycle air conditioning, as this is the most efficient heating and cooling system available. Select a system within 1 Star of the best available on the market.

When deciding the design and layout of your renovation, create zones within the house so that you do not unnecessarily heat or cool areas that are not in use. For example, closing off the living area from hallways with additional doors, will improve the comfort in the living room and reduce the heating/cooling demand. See electric heating buyers guide for more information [here](#).

Induction Cooktop

Induction cooking heats food quickly and evenly, while the surfaces around the pan stay cool and safe. They are safer for families and better for our health and wellbeing.

If your cooktop will be the only gas appliance in your home, you could save hundreds each year on connection fees by choosing electric instead. See induction cooktop buyers guide for more information [here](#).

RENEWABLE ENERGY

Solar PV

Installing a solar photovoltaic (PV) system allows you to generate renewable energy and reduce your electricity bills.

[Use an online calculator](#) to estimate how much you could save by installing a solar PV system and the payback period of the system.

Solar panels are generally placed on the roof of your home and perform best when oriented to face north so that they have good access to the sun. Where roof-space is limited facing north, the panels can be placed on the east and west façade.

Green Power

By choosing a 100% [GreenPower](#) plan from your electricity retailer, you can power your home with renewable energy.

Electric Vehicle (EV) charging

Even if you do not currently own an electric vehicle, it is a good idea to install the infrastructure to support future electric vehicle charging, as it can be harder and more expensive to retrofit the infrastructure later. Having the infrastructure installed to support a charger in future is what is referred to as being 'electric vehicle ready'.

The level of infrastructure required depends on the speed of charging you want or need, and how much electrical energy your current home wiring can deliver. Some chargers can operate where there is a main power supply, however it is recommended that you install a power circuit specifically designed for EV charging, to improve safety and reduce the time to charge. See maximum demand guideline for more information [here](#).

Public chargers are also available for you to charge your EV at. To find EV charging locations near you, check out the [Electric Vehicle Council](#) or [PlugShare](#) maps.

Electric Vehicles

Electric cars are powered by electricity rather than petrol or diesel.

If you are buying a new vehicle, consider whether an electric or hybrid vehicle will suit your lifestyle. Electric vehicles are becoming more efficient and developing longer ranges, and you can charge an electric vehicle at your home or at public charging stations.

Electric cars are cheaper to run than fossil fuel-based cars, and cleaner for the environment. Some electric vehicles also have bi-directional charging capability, which means they can also function as a home battery; storing energy generated by your solar PV system and then releasing that energy back into the home when needed.

See AEVA's website for more information [here](#).

Electric bikes

You may consider purchasing an electric bike before investing in an electric car. E-bikes have an electric motor and battery that provides additional power to the person riding the bike.

To compare the costs of electric transport options, you can use the [electric vehicle cost calculator](#).

UPGRADE EXISTING AREAS

When extending, it may not be affordable to upgrade your entire home with the most efficient options, however, it could be a good opportunity to complete efficiency upgrades in existing areas of the house whilst trades are already on site.

Speak to your energy assessor and builder about some quick wins to complete while the extension is being done and trades are already on site

Some quick wins with extensions can include:

- Adding under floor insulation to the whole house
- Upgrading your lighting to LED for the whole house
- Upgrading ceiling insulation to the whole house, don't be afraid to go above minimum standards
- Draught sealing the entire house, see [link](#) for draught proofing tips
- If the internal plaster needs renewing soon, consider replacing it so that you can install, replace or increase the insulation in your walls
- Installing heavy blinds or honeycomb blinds with pelmets to the entire house to stop heat escaping or entering the house
- Upgrading your switch board to be solar and EV ready

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QUESTIONS TO ASK YOUR BUILDER

To ensure quality assurance on sustainability items, we recommend asking the following questions when selecting your builder:

- Air Sealing: Can you guarantee appropriate sealing levels? Are you willing to do a blower door test? Can trades work together to seal the vapour barrier?
- Insulation: is it possible to install insulation in my home? Can your installer guarantee good coverage? Can your installer take appropriate safety precautions?
- Passive solar design: is the architect, designer or builder integrating passive solar design principles into the home? Do you have a regular energy assessor and are they happy to get involved early in the design?
- Sourcing materials: are your materials bought locally? Is the timber from sustainable plantations? Do you ever re-use or recycle non-toxic materials? Do you have any good low embodied carbon material recommendations?
- Waste: What is your waste minimisation strategy?
- Windows: how are the windows going to be shaded in summer? What material is the window frame? Can we have thermal breaks in the window if aluminium?

For further info on questions to ask your builder see [Sustainability Victoria](#).

URBAN COOLING AND WATER SENSITIVE URBAN DESIGN

Urban heat is the cumulative effect of urban materials capturing and radiating heat back into an urban area. On a hot day this results in elevated temperatures above the regional average temperature which can result in sickness and death.

The built environment can be designed to combat this by including:

- Light weight and light-coloured materials;
- Shading;
- Vegetation and green infrastructure;
- Improving the thermal efficiency and ventilation of existing dwellings;

Look out for Council's Urban Cooling Page currently under construction for more detail.

Water Sensitive Urban Design

Water sensitive urban design (WSUD) is an approach to design that minimises the impact of buildings on the surrounding landscape and waterways. It makes use of rainwater on the site and reduces the amount of water that flows out to stormwater drains

Rainwater collected from roof areas can be diverted to a **rainwater tank** and stored for use within the home. Typically, rainwater tanks are connected to all toilets within a dwelling and can also be used for laundry washing and irrigations. For renovations, rainwater tanks can be connected to any new toilets or laundries, if included in the new building area.

Collecting and re-using rainwater on-site will help reduce the amount of potable (mains) water that your home uses and reduce the risk of localised flooding.

When designing your home, it is best to locate your rainwater tank centrally, and align with the direction of your roof and location of downpipes.

Speak to your plumber for advice on how to optimise your roof design for stormwater capture.

Also see [rainwater tank calculator](#) for optimal water tank size calculations.