

Building a more sustainable home

A handy checklist!



Check out our handy checklist of ideas you can consider to construct a more sustainable home.

Sustainable homes are healthier to live in, cheaper to run and will future proof your home as Australia moves away from fossil fuels.

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

- Engage an energy assessor early to provide guidance on how to design your home to achieve an 7 Star (or higher) **NatHERS Rating**. Use floor plans developed by **Your Home** for guidance.
- Specify a high level of 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 aluminium frames, to minimise heat transfer through the frame.
- Design for 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 house through proper sealing of internal walls and ceilings as well as external gaps like pipework or ducts.
- Specify LED lights which use approximately 80% less electricity than the alternatives.
- Select low embodied carbon materials in the design of your new home.

Building a more sustainable home

A handy checklist!



ELECTRIFICATION

- Specify an efficient electric heat pump hot water system, which can be 3-5 times more efficient than the alternative options.
- Specify 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.
- Specify an electric induction cooktop.
- Power your home with renewable energy by installing solar PV panels. Consider installing 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.
- Purchase an electric vehicle or e-bike that can be charged on clean renewable energy.
- Design your garage/parking area to be electric vehicle (EV) ready by installing infrastructure to support future EV charging.

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 your roof to direct rainwater towards a centrally located rainwater tank. Connect the rainwater tank to all toilets in your home for re-use. Consider also connecting the tank to laundries for clothes washing.
- Design suitable remaining roof areas to direct towards a raingarden.

Professional Advice

Always seek professional advice for building works, including electrical and gas system repairs, modifications, and upgrades. Before starting any design planning, engage an energy assessor to provide expert guidance on how to design and specify your home to be highly efficient and comfortable for you and your family.

Building a more sustainable home

A handy checklist!



**NET ZERO
2030**
Every home, make it count



HOUSE 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.

Check out the [YourHome website](#) for access to free architect-designed floorplans for 7 and 8 star homes that you can use or take

inspiration and guidance from. When it is time to start your project, get assurances from your builder or designer that they have experience in the area.

For further detail regarding shading choice see Renew Magazine's buyers guide to shading [here](#).

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.

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](#).

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 building's 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>

Rating Tools

There are several sustainability ratings tools available, some of which are a requirement to achieve your building permit.

The [Nationwide House Energy Rating Scheme \(NatHERS\)](#) is a star rating system that measures the energy efficiency of a home, based on the design, orientation, materials and climate. A NatHERS rating is the most common method used to show that a new home complies with the minimum energy efficiency requirements in the National Construction Code (NCC). The current minimum rating required for homes in Kingston is 6 Stars, however this will change on 1 May 2024 to 7 Stars.

Building a more sustainable home

A handy checklist!



NET ZERO 2030
Every home, make it count



The [NatHERS website](#) describes these rating to mean:

- a 0-star rated home is quite uncomfortable—too hot in summer and too cold in winter. It will require a lot of energy to heat and cool.
- a home reaching a 7-star rating will need some mechanical heating and cooling to keep it comfortable to live in.
- a 10-star home is very energy efficient. It will remain comfortable year-round, with limited, or no mechanical cooling or heating.

NatHERS includes a voluntary [Whole of Home Assessment](#) which allows you to rate the choice of appliances within the home against a total annual energy use budget. The rating considers energy used for heating and cooling, and other appliances, minus the energy generated from solar PV panels.

The assessment provides you with a score out of 100, where 100 represents a net zero home and a score greater than 100 demonstrates a climate positive home (a home that generates more renewable energy on site than it consumes).

While a NatHERS rating of 10 is the highest and best, we recommend 7 Stars or higher, with a whole of home assessment of at least 100.

There are other voluntary [rating tools](#) that you can use to target higher levels of sustainability, energy efficiency and thermal comfort. Including Passive House, Green Star Homes and Living Building Challenge.

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.

From 1 January 2024, all new homes requiring a planning permit are required to be all-electric, and will be unable to connect to the gas network. Read our tips below to prepare.

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

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

Specify energy efficient reverse cycle air conditioning, as this is the most efficient heating and cooling system available.

Reverse cycle systems come in several types, including single split, multi-heat split and ducted. The most common of these is single split systems, which allow you to cool one room or area with a higher efficiency than the alternate options.

For single split system units, select a system within 1 Star of the best available on the market.

When deciding the design and layout of your home, 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

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](#).

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 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 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](#).

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.

Sustainable renovations

A handy checklist!

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](#).

WATER SENSITIVE URBAN DESIGN (WSUD)

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. This has many benefits, including increased vegetation in your garden, a cooler local environment, reduced water use (and bill savings), cleaner water flowing out to stormwater and a reduced risk of localised flooding.

Ways you can incorporate WSUD in your home include increasing the areas of permeable surfaces (surfaces that absorb water) in your garden, collecting and re-using rainwater on-site, and treating rainwater on-site with bio-retention systems.

Permeable surfaces

Permeable surfaces are surfaces that absorb water, such as soil, vegetation or permeable paving solutions. These surfaces assist in keeping rainwater on-site in the natural landscape, rather than shedding to stormwater drains.

Permeable pavements allow water to pass through the pavement and filter into the

ground below. They are a good option for areas of ground cover that require some level of structural stability, such as walkways and driveways.

Several permeable paving products are available including:

- pavements made from special asphalts that allow water to filter through the pavement surface
- concrete grid pavements that allow water to filter through gaps in the pavement
- plastic modular block pavements that allow water to filter through gaps in the pavement

Speak to your civil engineer as some soil compositions such as clay are not suited to permeable paving.

Rainwater capture and re-use

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.

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.

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

Raingardens

A [raingarden](#) is a specially designed garden bed that removes pollutants from stormwater runoff. Rainwater flows into the garden bed and filters through layers of engineered soil. The clean water is collected by slotted pipes and directed back into the traditional drainage system.

The surface traps litter, leaves and sediment while the soil helps to filter and breakdown microscopic pollutants such as nutrients, heavy metals and hydrocarbons.

Types of raingardens:

- **Planter box raingardens** are elevated garden beds that collect rainwater from a diverted roof downpipe.
- **In-ground raingardens** are located in the ground to collect rainwater from adjacent hard surfaces or a diverted roof downpipe.

Rain gardens filter pollutants from frequent low intensity showers (95% of all stormwater runoff). Traditional drainage systems (pits and pipes) are still required to cater for large

storms to prevent flooding.

For technical guidance on raingarden specifications check out Kingston's [Civil Design Requirements for Developers](#).

WSUD during construction

Ensure your builder considers WSUD during the demolition and construction stages of your project. Measures should be taken to reduce contaminants from building materials and soils on site flowing into stormwater drains when it rains. These include:

- Keeping mud off the road and on site
- Stop mud entering the stormwater system by installing sediment traps around the drains
- Placing rubbish bins on-site to contain litter
- Locating stockpiles away from low points on the site
- Covering stockpiles with tarp or mesh to control dust and reduce runoff
- Retaining existing vegetation on site

See the EPA website for further information regarding [WSUD in construction](#).

URBAN COOLING

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.