

The construction process

Every construction process is unique and depends on the scope and complexity of the project. But each time a sustainable house is built, the process follows typical steps, and the principles are similar for smaller scale projects like renovations.

The articles *Renovations and additions* and *Buying a home off the plan* include more information on the construction process specific to those situations.

Step 1: Choosing a builder

Before you get to the stage of choosing a builder, your research and design process will have yielded finished design documents to put out for tender by builders. (see *Preliminary research*; *The design process*)

Two common ways to choose a builder are:

- choose a preferred builder and invite them to prepare a quotation or 'tender' (and seek an alternative quotation to ensure competitive pricing)
- call open or selective tenders from a range of builders and choose on the basis of price.

Each method delivers a builder and a quotation but one emphasises best price and the other, preferred builder. In either case, note in your tender documents that you are 'not obliged to accept the lowest or any tender'.

A designer generally helps choose builders to tender for a project, based on recommendations and past experience. Advertised open tenders deliver variable outcomes and often exclude smaller specialist builders who do not have time to tender for multiple projects.

Your choice of builder is almost as critical as your choice of designer.

The principal role of a builder is to coordinate the building works as project manager. This role includes supervising and coordinating each trade; sourcing, quantifying and coordinating delivery of materials; and, most importantly, quality-assuring the entire process.

Builders and tradespeople are understandably risk-averse and tend to manage risk by using tried and proven materials and practices. Sustainable outcomes often require the use of innovative materials and practices. To avoid problems later, ensure each builder



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is made aware of your commitment to a sustainable home when they are invited to tender.

Sourcing certified environmentally preferred materials (see the section *Materials*) at competitive rates and supervising tradespeople to ensure materials are correctly installed requires a builder who is prepared to 'go the extra step'. Choose a builder who is both trained in and committed to delivering sustainable outcomes. Familiarise yourself with environmental certification systems to inform your own decision or agreement.

Both Master Builders Australia (MBA) and the Housing Industry Association (HIA) train builders in sustainable practices. Choosing a builder with this training from their website listings is a good first step but does not guarantee delivery of best practice outcomes. References from satisfied clients are an effective quality assurance method. Both MBA and HIA run sustainability awards programs and the lists of past winners on their websites also provide a good indication of ability.

Several certification schemes can independently certify products and services as environmentally sustainable. Good Environmental Choice Australia (GECA) is an independent, not-for-profit organisation that runs the internationally recognised Environmental Choice Australia Ecolabelling Program. Green Tick® is based on a life cycle assessment (LCA) of the effects of an operation down its supply chain.

Committed builders:

- carefully implement sustainability features as specified in the design
- source and use recycled or reused materials
- access environmentally certified materials and ensure they are ordered with adequate lead times
- separate waste streams on site
- instruct and even backcharge subcontractors who fail to use environmentally preferred practices
- ensure that glues, resins, paints and finishes are indoor air quality friendly
- conserve on-site biodiversity
- install and maintain sediment control barriers.



Green Tick Certified.



Good Environmental Choice Australia.

Step 2: Tender documents and contracts

In projects being tendered by more than one builder, this step precedes Step 1.

Tender documents must clearly identify any sustainability practices or materials certification requirements that are different from business as usual. Attach schedules to the tender documents that tenderers are required to sign.

Allaying builder concerns about the unfamiliar aspects of sustainable practice can reduce the amount they allow for unknown contingencies.

Contingency sums

Areas of unknown risk can be accommodated through contingency sums or allowances that can be called on to cover unexpected costs. They are often used to cover unexpected subsoil and foundation related costs; increasingly they are being used to provide flexibility in choosing innovative sustainable technologies and practices.

Prime cost schedules

Another way to overcome risk aversion on the part of the builder is to 'nominate' subcontractors to supply and install innovative technologies and provide the builder with a 'schedule of allowances' (or 'prime cost schedule') to include in the tender.

Many designers choose and specify the exact make and model of important or high cost items such as windows and doors, solar hot water systems, smart metering and energy control systems, and on-site renewable energy generation. You or your designer can have these items quoted by preferred suppliers and nominated in the contract as prime cost schedule items to avoid substitution of inappropriate or substandard products by competitive tenderers.

Preferred subcontractors

You can also nominate preferred subcontractors if you know a local green plumber, electrician or painter who is reliable and professional. Many builders have preferred subcontractors so negotiate this option carefully.

Lump sum versus cost plus

Choose between 'fixed price/lump sum' or 'cost plus'. These decisions are usually made before calling tenders but revisions may be negotiated with the chosen builder before contracts are signed. Lump sum tenders and contracts are generally effective at capping the budget but can encourage cost cutting that can compromise sustainable outcomes.

In cost plus scenarios, the builder nominates a percentage addition to materials costs for ordering and scheduling, and hourly rates for the builder and trades. These contracts require high levels of trust between owner and builder. While allowing the owner more control over expenditure decisions, they reduce builder responsibility for cost overruns. This can force

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cost cutting and loss of important sustainable features (e.g. photovoltaic arrays) as the budget is exhausted.

For tight budgets, fixed price contracts are generally preferable. If cost plus is used, quarantine budget allowances for sustainable features.

Contracts

Standard home building contracts are available from many sources including lending authorities and industry peak bodies. They form the basis of your legally binding agreement with your builder, and of any dispute resolution.

Choose a contract that strikes a reasonable balance between your needs and those of your builder. Clear dispute resolution provisions and nominated independent arbitrators are essential. Annex the builder's tender, council approved plans and specifications, certified engineering details and any schedules (prime cost, contingency sums or nominated suppliers/contractors) to the contract.

Have your solicitor and designer review your contract before signing.

Indicate sustainability requirements on specifications and include penalties for substituting inferior materials and products.

Owner building

Some consumers choose to manage their own projects as owner builders. Unless you are experienced in housing construction, are fully conversant with local building practices and supply chains, and have sound working relationships with local trades, this option is fraught with risk.

Sustainable construction often requires tradespeople to adopt new practices and materials and this can be very difficult for an inexperienced owner builder to negotiate.

Step 3: Construction supervision and certification

Many opportunities to achieve best practice sustainable outcomes are lost during construction. This is often due to lack of understanding of environmentally sound principles and practices by builders and tradespeople, or ineffective certification.

Supervision

Your builder is frequently called on to make decisions about materials and procedures that vary from those nominated in the plans and specifications due to trade

Tendering tips to ensure environmentally preferred outcomes

Drawings and specifications form part of the contract documentation. Ensure they clearly indicate sustainability requirements and include penalties for substitution of inferior materials and products.

Consider nominating important, high cost items such as windows in a prime cost schedule to avoid substitution by competitive tenderers.

Clearly describe sustainable methods or materials that are not yet standard building practice and include advice on how to implement or source them.

Include unambiguous instructions that prevent changes or substitution without approval by you or your designer.

Ask tendering builders to check tender documents for sustainability compliance risks and note or allow for any contingencies in their tender.

Ask builders to recommend alternative solutions that suit their trades and supply chains while delivering equal or improved environmental outcomes.

Consider the use of contracts that link payment to the achievement of specified environmental outcomes (e.g. details of environmentally certified materials, window and glazing specifications, and reuse or recycling details).

Develop a schedule of reusable materials (if you're renovating or demolishing an existing house) and negotiate their reuse with your builder.



Photo: eadig14245 John Baker & DSEWPac

Sediment fences prevent environmental damage from building site runoff into waterways.



Keep the site clean by storing all waste in skips.

preferences or unavailability of preferred materials. Builders refer these (often urgent) decisions to a supervisor for verification if one is nominated. If not, they may make expeditious but less sustainable choices.

Well-informed advice from experienced professionals can quality-assure decision making and ensure environmentally preferred choices.

Professional advice or project management by a committed, highly informed individual or company is critical to quality-assure the decision-making process and recommend environmentally preferred alternatives such as those discussed throughout *Your Home*.

Many designers offer a supervision service as part of their fee structure. Architects in some states are prevented from offering project management services. If you adopt this role as owner, consult competent advisers or consultants to verify your decisions.

Project management or supervision adds substantial professional indemnity risk to a designer's insurance profile so many designers prefer a less formal advisory role. You should sight a project management endorsement on a current professional indemnity policy before formally appointing a supervisor or project manager.

Certification

Inspection and certification of your project at critical stages is required by law to confirm that it is built in accordance with the approved plans, specifications, relevant Australian Standards, Building Code of Australia and council regulations, to ensure structural integrity, health, safety and amenity.

These inspections can identify and rectify problems or omissions before they are built in. Reported instances of inadequate certification of sustainability compliance in several jurisdictions indicate that this important aspect is sometimes overlooked. If you are concerned, seek immediate advice from your designer or building sustainability assessor. (see *The design process*)

Many private certifiers offer specialised environmental certification. Contact the Australian Institute of Building Surveyors (www.aibs.com.au) for more advice.

Step 4: Commissioning and handover

Sometimes the best design and construction innovation can be wasted because the concepts aren't communicated to the owner at handover. Ask your designer and builder for an owner's manual. If you are a practitioner, give your client detailed instructions on how to operate and maintain the home at handover. If you sell your home make sure the new owners have a copy.

■ An owner's manual or operation guide covers:

- summer and winter operation settings and day-night routines for:
 - operating and maintaining heating and cooling appliances
 - opening/closing curtains and windows
 - operating ventilation systems (cross and stack)
 - operating shading systems
 - operating roof space ventilator
- cleaning of solar appliances
- termite barriers and inspection schedule
- operating guides for water harvesting and treatment systems
- isolation valves for services (gas, electricity and water)
- hot water system sacrificial anode replacement date
- hot water system pressure relief valve checks
- painting intervals
- appropriate cleaning products for all surfaces and finishes
- landscape maintenance requirements.

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Take care to avoid these pitfalls

Common causes of disappointment or dispute emerge from choosing the wrong designer or builder, or both.

Budget overruns can arise from circumstances within or beyond your control:

- preliminary cost overruns (e.g. council fees, design, geotechnical report, engineering design and certification, surveyor fees)
- site challenges (unforeseen site difficulties)
- weather
- materials unavailability
- not 'nailing' the details (e.g. materials selection or indoor air-quality friendly finishes)
- receiving/accepting poor advice (particularly from suppliers and inexperienced tradespeople) when urgent decisions need to be made.

Very few new design/build projects fit within the client's timeline expectations due to:

- council delays
- lengthy design processes — particularly when many changes are made
- delays finding an available builder
- weather and builder related delays
- tradespeople shortages
- availability and delivery of sustainable technologies that are outside the builder's normal supply chain.

Negotiating reasonable, equitable compromises may be beyond your capabilities.

Under-performance can be due to design, construction or operation:

- Thermal performance may not deliver to expectations, commonly because of poor operation, poor sealing, failure to close or open windows, inadequate or faulty insulation, inadequate shading, and use of inappropriate glass. A building sustainability assessor can advise on these matters.
- If energy consumption is higher than expected, monitor consumption of individual appliances, and install smart metering or energy management systems. The behaviour of one individual in a household can often unknowingly account for excessive energy use.

References and additional reading

ACT Planning and Land Authority. Design and build. www.actpla.act.gov.au

Australian Building Codes Board. www.abcb.gov.au

Australian Institute of Building Surveyors. www.aibs.com.au

Australian Local Government Association. www.alga.asn.au

Building Commission Victoria. www.buildingcommission.com.au

Good Environmental Choice Australia (GECA). www.geca.org.au

GreenTick Certification. www.greentick.com

HIA GreenSmart professionals listed by postcode: <http://tradebuild.com.au>

HIA Housing Local. <http://housinglocal.com.au>

Home Design Directory. Construction cost calculator. www.homedesigndirectory.com.au

Master Builders Australia. www.masterbuilders.com.au

New building cost guides. www.cordellestimating.com.au/costguides

Northern Territory Department of Lands, Planning and the Environment. www.dlpe.nt.gov.au

NSW Department of Planning and Infrastructure. www.planning.nsw.gov.au/

Queensland Department of State Development, Infrastructure and Planning. www.dsdip.qld.gov.au

South Australian Department of Planning, Transport and Infrastructure. www.dplg.sa.gov.au

Sustainability Victoria. www.sustainability.vic.gov.au

Tasmanian Infrastructure and Resource Information Service (IRIS), Planning and Development. <http://irisplanning.tas.gov.au>

Victorian Department of Planning and Community Development. www.dpcd.vic.gov.au/planning

West Australian Planning Commission. www.planning.wa.gov.au

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