

# Planning home improvements

With house prices flattening and energy costs rapidly increasing both nationally and globally, improving the energy efficiency of your existing home presents an opportunity to ‘future proof’ your investment.

Along with this article, read *Buying an existing home*, which may help minimise home improvement costs by explaining what to look for; *Repairs and maintenance*, which has guidance on general repairs and maintenance; and *Renovations and additions*, which follows this article.



Photo: Paul Downton

Adapt your home to work with the climate and not against it.



Photo: Kathie Stove

Additions are limited only by your imagination.

## Preliminary research

*Preliminary research* has tips for analysing your existing home (Step 6) and gives an overview of considerations before starting to plan the upgrade. Upgrading can be expensive but the cost can be greatly reduced by seeking expert advice and choosing carefully.

## Climate-appropriate improvements

The information and climate zone map in *Design for climate* is a good place to begin identifying and understanding how to adapt your home to work with your climate rather than against it.

- Is the predominant need for heating, cooling or both?
- How might you achieve ideal levels of thermal comfort?

## Determining your household’s heating and cooling needs

Consider your family’s heating and cooling needs on a room-by-room basis to gain a sound understanding of where heating and cooling is required. Seek expert advice on the best heating and cooling strategies for meeting those needs efficiently and effectively during the various stages of your renovation.

Make achieving thermal comfort with the lowest ongoing operating cost central to your decision making at every stage. Passive heating and cooling is free to operate but upgrading a home to achieve better thermal comfort (more stars under the Nationwide House Energy Rating Scheme (NatHERS)) does cost money but rewards with lower energy bills – particularly in climates with high auxiliary heating or cooling needs. (see *Design for climate*)

The cost of improving the rating of a poorly performing house varies enormously. By planning well you can reduce these costs significantly and add value to your home.

## Achieving your dream home in affordable steps

A well-planned, staged journey in which your home meets your needs at each stage of your life often delivers a more affordable, comfortable and flexible lifestyle. (see *Affordability*)

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A 'back-casting' exercise can be a useful way to explore your needs and options for meeting them.

Back-casting starts with developing a vision of your ideal future home and working back to identify all the steps that might be required to achieve it from what you need and can afford now.

*Start with a vision of your ideal home and work back to identify how to achieve it.*

The aim of this exercise is to identify and prioritise features and inclusions that meet your needs and circumstances at each stage of your life rather than trying to find and finance a home that satisfies them all at the start.

Back-casting often highlights how the early inclusion of sustainable features that increase comfort, reduce bills and contribute to mortgage payments can create more flexible and affordable options later. It is also likely to highlight the importance of location. Being close to everything you need, including good public transport, helps to reduce living costs.

Viable pathways to your ultimate home can include either buying a home that meets your current needs and moving to another as your needs change, or choosing a smaller one that meets your current needs and has good potential for adaptation.

*Affordability* includes information on life cycle costing of the various improvements recommended in *Your Home*.

### Exploring the cost of improvement options

Before planning your improvements, do your homework on the likely cost of modifications, upgrades and additions. Assess the range of costs associated with:

- **repairs, maintenance and rectification** — removing rising damp, underpinning footings, repairing structural cracks, termite proofing, and replacing floors, walls, windows, ceilings or roofing
- **retrofitting sustainable features** — including external shading for difficult windows; insulation, window replacement, draught-proofing, rainwater tanks, high star rated toilets, water fittings and appliances; improvements to indoor air quality
- **minor renovations and upgrades** — bathroom, kitchen, hot water service, heating and cooling system, storage and cupboards, redecorating and furnishing
- **major renovations and additions** — talk to friends who have renovated or phone some builders to get a range of costs per square metre.

### Refining your brief

*Preliminary research* describes how to develop a brief for your designer. Add the findings of your home improvement analysis and research to your brief. You should now have a clear idea of your not-negotiable features, your preferences or wishes, and the approximate cost of adding them if not already included in the home you own.

### Developing a total concept plan for your home

*Well planned and executed home improvements add value to a home. Poor planning and execution wastes money and valuable resources.*

Your back-casting exercise identified concepts for converting your existing home into a comfortable, environmentally friendly one with low running costs.

Now you need to turn those concepts into achievable goals by developing a long-term strategy to take your dream home from concept to completion, in affordable stages that match your needs and available budget.

Adapt the four step process outlined below to:

- lock in the most cost effective improvements first
- plan major renovations and additions effectively
- eliminate or minimise lost opportunities and duplication.

*Define sustainability goals and strategies at the outset and consider environmental performance at every stage of the process. Don't treat it as an 'add-on' at the end.*

The needs of every household are unique. Make sure your strategy prioritises your improvements in each of these categories:

- **a maintenance schedule** to preserve or improve the condition of your home including rectification or removal of any dangerous, illegal or toxic sections that present health or injury risks
- **a list of simple, cost effective improvements** not requiring council approval that will reduce your operating costs
- **a demolition plan** showing sections that will be demolished or damaged during future additions so you don't renovate them
- **an overall plan** showing how the home will function and meet the lifestyle space and storage needs listed in your brief (including outdoor living areas) when the renovations are complete, or at each stage for staged renovations.

### Step 1: Choose appropriate professional advice

The first step in developing a home improvement strategy is to seek professional advice. If your renovation proposals are relatively simple, a builder who specialises in this type of work may be able to provide adequate advice and prepare simple concept plans and cost estimates.

More extensive renovations with alterations and additions need a designer who specialises in sustainable alterations and additions. Engage the designer to prepare concept designs and space arrangements that meet the needs and budget stages outlined in your brief (see *The design process*). Ask the designer to use a building sustainability assessor to help identify every opportunity to achieve high level thermal performance.

### Step 2: Reassess what you already have

Conduct a SWOT analysis of your current home with your designer to identify the most cost effective improvements. This exercise consolidates your earlier research, and allows you to explain your brief and prioritise your improvements. List all:

- **strengths** — current structures, spaces, uses and aspects that work well and should be retained
- **weaknesses** — rooms that are inadequate for purpose (e.g. in poor condition, in the wrong place, too big or small, too hot or cold) and require alteration, remediation, alternative use or demolition
- **opportunities** — to improve sun and breeze capture, swap room function, improve existing spaces by adding creative storage and room dividers, add rooms and apply passive design principles.
- **threats** — that require maintenance or repair or are structurally unsound. Most homes (or parts thereof) have a 'use by' date or finite life span.

### Step 3: Develop a concept to completion plan

This is arguably the most important step towards your ideal home. It is your best opportunity to satisfy your brief while locking in lower energy and water bills and better indoor comfort at lowest cost.

*Prioritise features that return high environmental benefit in energy, carbon and water savings.*

Ask your designer or builder to review your brief and future needs analysis and recommend innovative concept designs that address both your brief and SWOT analysis. Focus on strategies to improve rooms that are

currently too hot or too cold as you start to develop concept designs for your additions.

### Design objectives

Include in your concept to completion plan:

- a site plan that identifies breeze and solar access, noise and privacy issues, location of outdoor functions, play areas, composting, garbage and clothes drying, easements and services connection points
- a floor plan for the completed home that clearly identifies:
  - stages of renovation and addition
  - additions and how they link to existing spaces
  - adjustments to windows and doors
  - areas marked for alternative function, renovation or demolition
  - wet areas (bathrooms, toilets, laundry) to allow flexible renovation order
  - furniture layout, and room dividers that include storage and cupboards
- thermal comfort analysis to:
  - create or retain north facing living areas (except in tropical climates)
  - orientate living areas to capture cooling breezes (tropical climates)
  - reorientate, resize or shade problem glazing
  - enhance cross ventilation and daylighting
  - provide buffer zones (garage or service area) to overcome adverse orientation
  - determine optimal insulation levels and installation details
- preliminary choice of construction systems that suit the climate, streetscape and existing structure
- a strategy to maximise retention or reuse of existing structure and capture viable opportunities to reuse or recycle demolition materials
- type and location of major appliances including heating and cooling, hot water service and renewable energy generation, smart metering and grid feed options
- access and livability during construction (e.g. whether and for how long you might need to vacate the home during alterations) to inform construction scheduling
- strategies to ensure the choice of materials on an environmentally preferred basis
- consideration of construction access and space for materials storage and waste skips.

For advice on specific climate responses see *Design for climate; Passive solar heating; Passive cooling; Orientation; Glazing; Insulation; Thermal mass.*

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### Building form

Keep it simple. Capture the strengths of the existing home and capitalise on the opportunities identified in your SWOT analysis. Complex design or modification of multiple rooms will result in costly, complicated and disruptive construction.

*The most permanent and rapidly growing housing trend is sustainability.*

Building form that suits the climate improves thermal comfort and influences subsequent decisions about how and where you position new rooms, connect them to the existing house and adapt existing spaces.

Ideal building forms:

- in cool climates, maximise internal space while minimising external wall and roof area where heat loss occurs
- in warmer climates, become increasingly elongated or articulated to maximise breeze exposure and cross ventilation
- minimise adverse impacts on neighbours by thoughtful location of rooms and windows to reduce overshadowing, overlooking and noise transmission (e.g. outdoor living areas not next to their bedroom window or your first floor balcony not overlooking their outdoor living area)
- harmonise with the existing street character (without necessarily cloning it) and meet planning requirements for height, massing and setbacks
- maintain the streetscape by minimising the visual impact of garages and impervious driveway surfaces to reduce stormwater flows
- minimise the need to remove existing trees; replace removed trees with low-water local native or non-weedy deciduous plantings to soften the building in the streetscape while providing useful shade, breeze diversion and wind protection
- maintain clear sight lines between entry and street to increase safety and security.

For more detailed information see *Passive cooling*; *Passive solar heating*; and the appendices *Streetscape*; *Noise control*; *Landscaping and garden design*.

### Space configuration around the living core

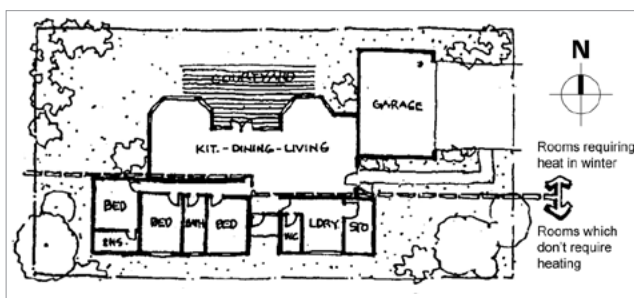
Make the primary focus of your overall design the position of the home's 'living core'. This core centres on the kitchen and influences the positioning of living spaces – both internal and external. Good flow between indoor and outdoor spaces is essential. Carefully position the living core to receive winter sun and cross ventilation.

This positioning often influences the location and function of any additional rooms you might build.

**In single-storey homes in most climates**, this planning exercise often sees bedrooms and bathrooms relocated to the south side of the home (with bathrooms located close to other wet areas to reduce hot water pipe runs and plumbing/drainage costs).

Southerly bedrooms are generally the best option for night-time sleeping comfort in most climates because winter comfort can be simply achieved with warm bedding or electric blankets in colder climates. Summer sleeping comfort is usually the more important consideration. In tropical climates, breezes and cooling air movement should be the primary focus for locating living areas and bedrooms.

Give special consideration to thermal comfort in bedrooms for the disabled or elderly who may be bed-ridden for long periods.



Source: Amcord

Configure rooms to give the best passive design benefits.

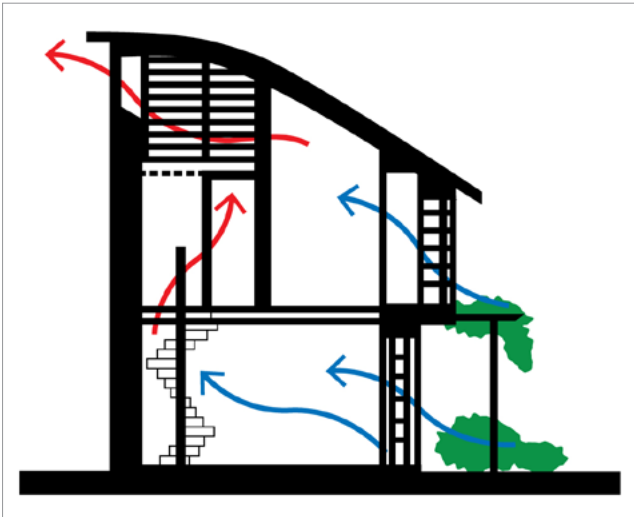
**In two-storey homes**, level access from garage to kitchen and living area is generally a high priority. Locate at least one bedroom on the ground floor so occupants can stay there as they age. It can double as a home office, study or bedroom for an elderly relative, carer or boarder. Locate a 'house' bathroom and toilet at living area level.

When planning a first floor addition, the staircase location is usually the most important design consideration. It should not disrupt the flow of existing ground floor spaces and should deliver you to a central area on the first floor to avoid wasteful, draughty hallways. Consider using the stairwell for stack ventilation in summer but make sure it can be closed off in winter.

Thermally separate first floor bedrooms from the ground floor to avoid overheating from daytime heat gains in summer and loss of ground floor heating through convection in winter.

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Convection causes warm air to rise, drawing in cool air.

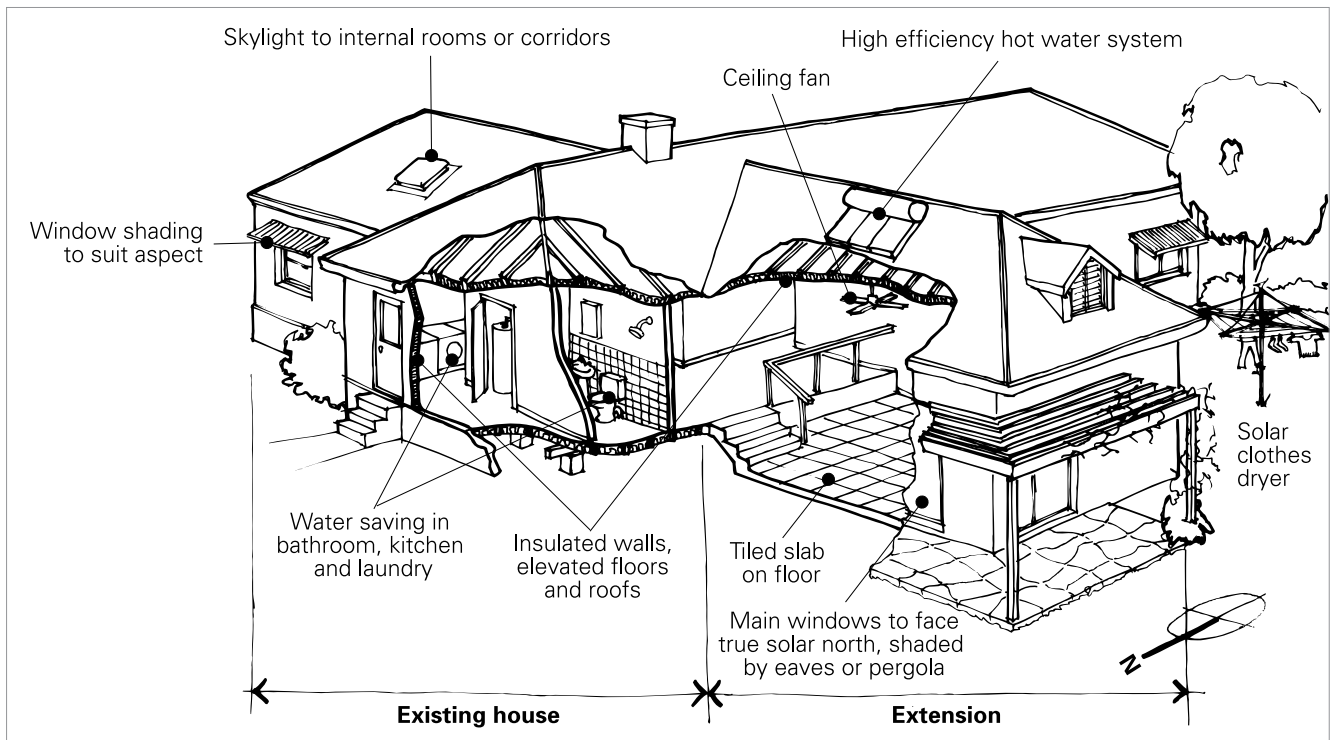
### Positioning rooms to suit the flow of people, warmth and 'coolth'

**In climates that require both heating and cooling,** position new rooms and windows to maximise solar heat gains and cooling breezes. Think about how to create controllable breeze and heat-flow paths to distribute these benefits within the existing home. Remember hot air rises and cold draughts tend to stay low.

Open plan can make for enjoyable living and enhance ventilation in summer but make sure the whole house is capable of division into heating and cooling zones during seasonal extremes. This zoning limits the impact of convection, drafts and temperature stratification in winter and prevents first floor rooms from overheating in summer. (see *Design for climate; Passive solar heating; Passive cooling*)

**In hot humid climates,** remember that breezes can be diverted. Consider additions or plantings to funnel prevailing cooling breezes through the home. Create openings on the opposite side of the house to draw the breezes through and out. Smaller openings on the windward side and larger openings on the leeward side can increase airflow through the 'venturi effect'. The height, shape and style of opening can vary the internal airflow path. Open plan living areas are preferable.

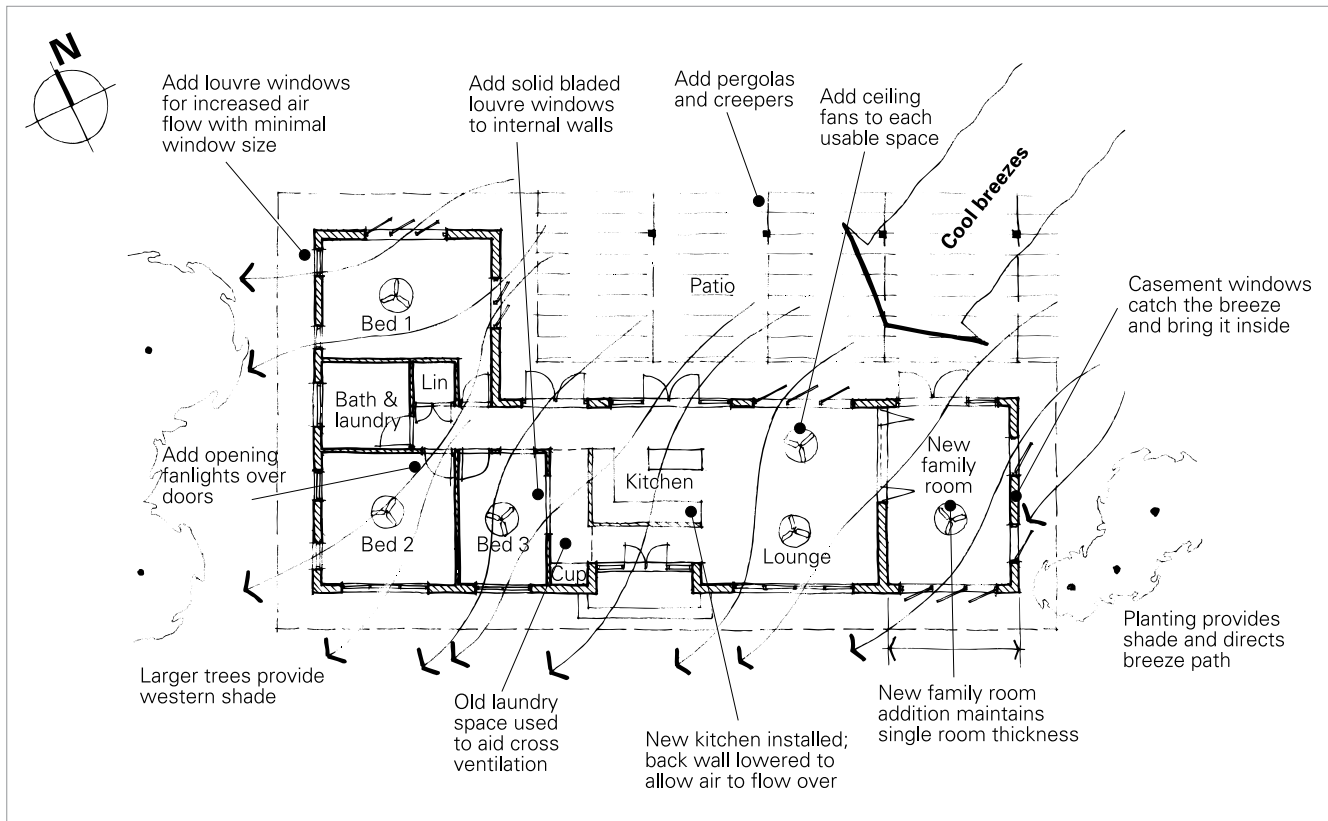
All doors and windows should have 100% opening capacity (bi-fold, louvre or casement). Sleeping comfort is the most critical consideration in these climates. Solid-blade louvres above doors or in walls can increase air movement on hot nights and provide privacy in more moderate weather.



An extension can open the house to passive solar heating.

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Some of the many ways to passively cool a tropical house.

An alternative layout for these climates is separate living 'pods' accessed by covered and privately screened or planted decks or walkways. They allow maximum breeze exposure and separate living and sleeping spaces to minimise heat transfer. These layouts often simplify the design of additions. (see *Design for climate; Passive cooling*)

### Connecting new to old

The design should make effective use of existing space to reduce construction costs and environmental impact, while creating a seamless connection between new and old and enhancing the flow between indoors and outdoors.

*Make effective use of existing space while creating a seamless connection between new and old.*

Connections between existing and new rooms require careful design to minimise the number and size of 'incisions' in the existing structure – and reduce cost and waste. Innovative links can include sunny living areas or service hallways that house laundry, storage and bathroom. They can create sheltered, sunny al

fresco living areas on the north and practical service areas for waste, recycling, hot water service and heating/cooling plant on the south.

### Fine-tuning room shape, number and size

Include accurate measurements of all existing and proposed furniture you intend using in your home in your brief. Ask your designer to draw each item at scale so you can cut them out and experiment with layouts on your floor plan to make sure your furniture fits and allows adequate circulation and movement. Try to identify opportunities to reduce floor area by improving shape or layout – and save up to \$2,500 a square metre.

Reducing floor area might also:

- create enough space to move a window or wall in from the boundary by a metre or so to improve solar access
- allow adequate eaves overhang for passive shading without encroaching on setbacks
- create better outdoor spaces and reduce overshadowing.

Some design tips:

- Hallways and passageways are dead money so try to reduce them through better arrangement of rooms.
- Separate laundries are becoming redundant with today's appliances and lifestyles. Consider relocating the laundry in a cupboard off a living area or hallway to open living areas up to the outdoors.
- Locate furniture away from winter draughts in cooler climates by considering the location of heaters and windows, and replace or install zoning doors.
- In hotter climates, try to locate beds in direct breeze paths and redesign openings to ensure this happens.
- Rectangular bedrooms often give a feeling of space without wasting it. Larger spaces either side of the bed are often more useful than at the end of the bed.
- Clever furniture design in children's bedrooms can create exciting spaces for study, play, storage and friends while minimising floor space to collect dirty clothes and abandoned projects.
- A hideaway home-office computer workstation and filing cabinet in a guest bedroom can facilitate dual use without the need for an extra room.

### Storage

Adequate, purpose-designed storage for every item in your home is critical for effective use of space. Check the list you made during the research and brief development stage to see if each need is met. (see *Preliminary research*)

Alterations and additions can sometimes create awkward leftover spaces that are ideal for purpose-built storage. Other locations include room dividers, lift-up trap doors to sealed containers fixed to floor timbers and well insulated pop-out cupboards to replace west facing windows. Be creative with storage and hire a professional company that specialises in innovation.

### Important design outcomes

Before signing off on the design with your designer, check that:

- as much of the existing building/site structure as practicable has been incorporated into the renovation to reduce materials use and waste going to landfill
- all viable opportunities to reuse or recycle demolition materials have been locked in
- thermal comfort has been improved by creating or retaining north facing living areas, reorientating problem glazing, enhancing cross ventilation and daylighting, and providing insulation or buffer zones (e.g. garage or service areas) to overcome adverse orientations

- the living core of the home and the other rooms and outdoor spaces it interacts with have been designed to meet the lifestyle and thermal comfort needs set in the brief
- the floor plan identifies a renovation/change of use schedule for each existing and new space
- storage and cupboards listed in the brief are positioned on the floor plan
- major appliances such as heating and cooling, hot water service and renewable energy generation systems have been positioned and integrated into the design
- wet areas (bathrooms, toilets and laundry) in the existing building are designed and positioned in your final plan to ensure you don't waste any pre-addition renovation
- construction has been designed and scheduled in stages that allow continual occupation or times when the home must be vacated are identified
- construction systems suited to climate, streetscape and design have been chosen
- the plans include instructions to your builder to ensure that materials are chosen on an environmentally preferred basis during construction
- site planning allows for construction access, materials storage and waste separation skips
- space has been allocated for rainwater tanks, clothes line, food production gardens and landscaping, outdoor living and play areas.

### Step 4: Firm up your budget

Obtain preliminary cost estimates for each stage of renovation or addition in your plan to allow you to schedule each stage to suit your budget and needs. It may be some time before you start your renovations or additions and prices may change; however, indicative costings for planning purposes are usually adequate at this point.

It is difficult for builders to give binding quotations on preliminary designs. Some builders underestimate to compete on cost while others overestimate to allow for changes, contingencies or problems. It is best to get a few estimates and plan for the final cost to be in the upper end of the range.

Builders' preliminary cost estimates rarely come down but they often rise due to unforeseen problems, price increases or changes to the plans. Always set some budget aside for opportunities or contingencies that become evident during construction.

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*Builders' preliminary cost estimates rarely come down but they often rise. Always set some budget aside for opportunities or contingencies.*

Ask your designer or builder to estimate the cost of upgrading living areas or the whole home where possible to minimum 5 star thermal performance (6 or 7 in cooler climates and include bedrooms in hotter climates) and indicate what that might entail.

Ask them also to recommend reliable trades or suppliers to provide indicative costings for installing a range of highly efficient heating and cooling systems in one or two rooms or the whole house (whole-house systems should be capable of being zoned).

The advice and preliminary cost estimates you receive from your designer or builder and heating and cooling experts may influence earlier design decisions. Your design can be modified to incorporate any changes during final design detailing and documentation.

## Implementing your improvements

When you are satisfied with your overall concept to completion strategy and the costings you have received, you are ready to set timeframes for each stage. Implementation often begins with repairs and maintenance or low cost improvements. More substantial additions are often deferred for up to several years to respond to needs if or when they arise. The staged strategy you have developed is a critical reference tool to guide your early improvements and avoid wasteful duplication. (see *Repairs and maintenance; Renovations and additions*)

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## Author

Chris Reardon, 2013