

EXISTING BUILDINGS

Retrofits And Building Maintenance

Introduction:

This chapter aims to give guidance for the maintenance and retrofitting of existing buildings. Basically the aim should be to work towards the standards described in the previous chapters. However there are obviously limitations to the options available in an existing building and the cost-benefit ratios of any retrofit needs to be considered. One serious issue is that there is often limited information available about the environmental performance of a building and sometimes even about the services contained in it.

Re-using an existing building is nearly always environmentally preferable to building a new building. There are many measures that can be undertaken to make existing buildings perform better.

Getting Started:

A first step in improving an existing building should be to measure electricity and water use. It is important to know how much money is spent on water and electricity in order to estimate the benefits of measures taken and to establish a baseline to measure progress against. Ideally it should be measured how much electricity is used for what purpose to identify areas where the biggest savings can be made.

For buildings with relatively high electricity (over 200 kWh per m² per year) and/or water bills it is advisable to engage a consultant specialising in energy and water conservation to audit the building and to suggest measures that would be cost-effective. Another option is to employ an in-house environmental manager to address these issues.

However there are certain common sense things that can be done without engaging a specialist. Good general maintenance is important to avoid unnecessary waste of energy and water. As an example: Leaking taps and toilet cisterns are a common cause for high water use and dirty light fittings and badly maintained air-conditioning systems can waste energy. Dirty light fittings in a clean office can result in 25% reduced lighting levels.

Setting Priorities:

Those measures that are easy and cheap to implement and those that have short payback times should be implemented first. This will improve confidence for future measures, especially if savings can be monitored and reinvested in further initiatives. It is therefore important that measures are prioritised and a brainstorming session to identify measures and priorities can be useful. Jobs could be bundled, so that fast pay-back jobs can subsidise those with longer payback periods.

The remaining lifetime of the building should be estimated, to establish cost/benefit ratios for any new measures. For buildings with a remaining life time of 20 years or more the goal during major retrofits should be to comply as closely as possible with the requirements for new buildings listed in the previous chapters.

Whenever a piece of equipment is replaced or new materials are used for renovations the same principles as for new buildings should apply (see the previous chapters).

Replacing unsustainable products with more sustainable products does not make sense environmentally, because this results in further resource use. An exception is where toxic products cause health concerns for occupants (such as PCBs or asbestos). When toxic products are removed appropriate disposal must be ensured. The Auckland Regional Council can give advice on the disposal of hazardous substances.

Energy Management:

Energy Performance Contracts can be a good option to increase energy efficiency. This is a contract with a consultant in which the building occupier and the consultant share the energy savings that result from changes initiated by the consultant. The more the consultant saves the building occupier the more he/she gets paid. There are many variations to this set-up and if you are considering a Performance Contract you should contact EECA for further information and a list of consultants.

Appointing an in-house energy or general environmental manager can also work well. This person would be responsible for monitoring energy (and water) use and working out action plans to reduce consumption. EECA can be contacted for advice on good energy management and training courses for building managers.

Basic measures to improve environmental performance in existing buildings:

These are basic measures that should be taken during the normal maintenance of existing buildings to gradually improve environmental performance.

When fluorescent tubes are replaced, replacement should generally be with 26 mm new generation tri-phosphor tubes or T5 tubes.

Ensure that light diffusers and reflectors and tubes are cleaned regularly, even if they look clean.

Invest in a light meter to check that areas are not over lit. Where light levels are too high, fluorescent tubes can be taken out of fittings (one tube might be removed from a fitting containing three tubes). Specular reflectors will increase the light level and as a result some fittings could be de-lamped. EECA can supply stickers for the empty fittings so that lights are not accidentally replaced later on.

Light colours should be used when redecorating because this will reflect light and reduce the amount of artificial light required.

Where overheating is a problem, blinds and shades or window films on the northern and western sides of the building can help to reduce the load on the air-conditioning system and reduce overheating.

Ensure that the air-conditioning system reflects the needs of the occupants and that it is maintained regularly. Cleaning filters regularly will increase the effectiveness and efficiency of the system.

Ensure that hot water is not delivered at a temperature above 55°C. Often a much lower temperature is appropriate.

Insulate older type hot water cylinders (If the cylinder is warm to touch, insulate it) and insulate the first two meters of hot water pipe (more if easily accessible).

Fit gizmos (weights to stop the flush when you let go of the button) to old single flush toilet cisterns, or replace the cisterns with dual flush types.

Ensure that there is a system in place to detect and repair leaks. There should be a maintenance schedule and building users should know who to contact about leaks.

When equipment is replaced, ensure that replacement is with the most energy and water efficient option practical (the life cycle costs needs to be considered).

Many photocopiers and printers have a power-saving stand by function, when they are not in regular use. When purchasing new equipment ensure that it has such a function as well as the ability to copy/print double sided.

All office equipment should be turned off when not in use, including computers over night.

Ensure occupant training and education on energy and water efficiency and general environmental practices. This may include switching computers off at night, reporting leaks, double sided printing, using recycled paper, cycling to work, etc.

When cleaning contracts are renewed it should be considered if environmentally preferable products could be specified. Cleaners should also be instructed to turn lights (and possibly other equipment, such as fans) off that were left on, when they leave.

Things to consider during major retrofits:

Major retrofits should achieve the standards described for new buildings as far as possible. Where the expected lifetime of a retrofitted building is less than 20 years, measures should be assessed on a cost-benefit basis.

The HVAC system:

Existing air-conditioning systems might not perform well if room layouts and the building use changes. Major retrofits are a good time to assess the system, this should be done by a air-conditioning specialist, who is made aware that the aim is to conserve energy while maintaining adequate temperatures and air-exchanges.

Monitoring and Measurement:

Installing separate meters for lights, HVAC, lifts, etc. will let you monitor your electricity use better and will help you make more informed decisions. If this is not possible or practical ensure that they are on distinct circuits, because this will make it easier to install a temporary logger/hour meter to measure use.

Lighting:

To achieve optimal lighting efficiencies during a building retrofit, it is probably best to employ a lighting consultant experienced in energy efficient design.

Interior walls should be painted in light colours to better reflect light. Siting work areas where natural light is available will also help.

Sky-lights can help to bring light into areas with no or inadequate natural light. Sky-lights will cause some heat loss in winter and can contribute to overheating in summer. Double glazing of sky-lights is therefore recommended. Diffusers can be used to distribute light and to reduce glare.

Light shelves can be retrofitted to direct light from the periphery to the interior of the building.

Access Issues:

During major retrofits the access for those with disabilities should be improved wherever possible (see Concept Design Phase).

Many older buildings do not comply with the Building Code. However the aim should be to get as close as possible to compliance with the access and safety clauses in the code when major retrofits are undertaken. This may include supplying disabled toilets, access ramps, designated car parks and upgrading of floors to comply with slip resistance standards, etc. The Resource Handbook for Barrier Free Environments should be consulted, it is available from the Barrier Free New Zealand Trust, 1997, PO Box 10455, Hamilton, 07-8396545.

Waste Management:

During major retrofits waste needs to be managed carefully. Some of the removed materials may be hazardous and these need to be disposed of appropriately. The re-use of materials is encouraged where this will not undermine the overall performance of the building. As far as possible waste should be separated and recycled where possible.

Further Information:

Excellent advice on improving the energy efficiency of buildings can be obtained from the Energy Efficiency and Conservation Authority. They have lists of appropriately qualified consultants and a number of publications on the subject.

EECA, PO Box 388, Wellington, 04-470 2200 www.eeca.govt.nz

Information on general environmental issues and water saving could be available in-house. Waitakere City Council can be contacted for advice: 09-839 0400