Renewable energy retrofits

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**Overview**

The Department of Conservation is not only committed to sustainable business practices, it’s aiming to demonstrate leadership through its contributions to government policy on sustainability.

That means reducing our energy use and unnecessary travel, installing renewable energy sources at sites that are off the national electricity grid, and delivering more energy efficiency in DOC buildings. These all form part of DOC’s sustainable energy programme, launched in 2005.

As part of the programme, diesel generators on islands are making way for solar, wind and micro hydro; buildings are being better insulated; and old energy-hungry fridges and freezers are being unplugged.

Two big goals for 2012 are to halve diesel generator use and reduce electricity use by 15%.

Big gains for conservation are among the benefits arising from increasing DOC’s sustainability – as we move to renewable energy generation, money we used to spend on diesel, and the hours we used to spend on maintaining and running generators, now goes to conservation work.
The costs of running diesel generators on islands can be significant. National Office Sustainability Manager, Kathryn Maxwell, says the generator at the Motutapu Outdoor Education camp costs around $150,000 to run each year, and Motutapu is hardly remote. Transport costs to islands, such as the Chatham and Raoul Islands, mean that each kilowatt hour (kw/H) can cost between $1.00 and $1.65, compared with between $0.20 - $0.25 kw/H on the mainland grid.

Solar panels, which come in at $0.55 a kw/H, are a viable and attractive alternative that not only saves money, but will help the Department meet its stated commitment to lower greenhouse emissions and reduce off-grid diesel generator use by 50 per cent by 2012 (Greenhouse Gas emissions Reduction Plan 2008-2012). The Department has also declared its intent to reduce electricity use by 15 per cent by the same date.

Kathryn says there are a lot of peripheral costs with generators, too; “Rory Renwick, in the Warkworth Area Office, did an analysis of all the indirect costs – time and money – of running diesel generators. It came to about $14,600 a year – changing oil, replacing filters, maintenance on the generators. And this is all done by DOC staff, so you have biodiversity people tied up as mechanics and engineers.

“The cost of running diesel generators is so high it means there are fewer resources to do core conservation work.”

In addition, resupplying islands with diesel can be a logistical headache; Kathryn points out that the Department has always relied on the goodwill of the Royal New Zealand Navy to deliver fuel to remote Raoul Island, in the Kermadec group.

Likewise, supplying the Chatham Island Area Office means relying on a shipping monopoly that doesn’t always offer the most cost-effective option for the Department.

Renewable energy frees up budgets from these external costs and influences.

In 2005, DOC began replacing diesel generators at its island sites with renewable generation, including solar, wind and micro hydro.

Solar panels (photovoltaic cells) have been installed on buildings on Tiritiri Matangi, Hauturu/Little Barrier, Stewart Island/Rakiura, Mana, Maud and the Chathams. To maximise the benefits, the buildings are also being better insulated and old plant, such as fridges and freezers, replaced.

By March 2010, 50 DOC buildings – Area Offices, houses, volunteer quarters and lodges – had been fitted with solar water heaters, and a number have been insulated and fitted with hot water heat pumps. As well, double glazing has been installed in colder locations, such as Glenorchy, and Arthur’s Pass.

As part of the ongoing sustainability programme, there are plans to install solar panels on Motutapu and Great Barrier Island, both in the Hauraki Gulf.
A micro hydro system is also planned to augment solar panels on Kapiti Island, and solar hot water systems are to be installed at Kerr Bay campground at Nelson Lakes National Park, Momorangi Bay Motor Camp at Picton, and at the Motutapu Outdoor Education Camp on Motutapu Island.

As part of its annual reporting, DOC monitors efficiency indicators. In 2008/2009, these showed:

- Use of fuel oil for heating reduced by about two-thirds; from more than 51,000 litres in 2006/2007 to about 15,500 litres in 2008/2009.
- Electricity use dropped about 40%, from 6.7 million kWh in 2005/2006, to just over 4 million kWh.

Some of expected savings over time are:

- Chatham Islands conversion to renewables (solar photovoltaic panels) is tipped to save $10,669 a year
- The planned installation of solar and hydrogen storage on Matiu/Somes Island, in Wellington harbour, is anticipated to save nearly $13,000 each year.
- From 2012 onwards, the double-glazing, compact fluorescent lighting and insulation in DOC buildings around the country are estimated to save $114,000 a year in energy costs.

As a steward, DOC’s role as an environmental leader and advocate can only be enhanced when the public see its uptake of renewable energy.

A pleasant surprise, says Kathryn, “Is that the solar systems are working better than their specification. For example, the Chatham Islands are at 44° latitude, but Ken Hunt, the Area Manager there, says he's astounded by how much power gets produced, even on cloudy days. The same thing has happened on Mana.”

In the early stages of the programme, DOC partnered with Meridian subsidiary, Right House, which specialises in advice on energy efficiency and renewable technology. “They were critical to our success in the early days,” says Kathryn. Right House helped out with feasibility studies, and oversaw the first three installations, carried out by renewable equipment company Elemental Energy.

Since 2007/09, says Kathryn, the Energy Efficiency and Conservation Authority (EECA) partnered with DOC to go halves in a programme of solar hot water installations in DOC buildings.

EECA also audited the Department’s first round of projects; “and found that they were done very cost effectively”.

The Sustainability Programme is currently working with solar heating specialists Solar Group and Azzurro to install solar hot water heaters at DOC staff buildings and campgrounds.
Every project is underwritten by a formal contract.

**Process followed**

Between 50 and 60 hot water solar installations have been put out to tender.

**Challenges and pitfalls**

All the usual problems associated with islands have conspired on the retrofit programme, says Kathryn. “We’ve had occasions where we can’t get the gear out to the islands, because the weather was so difficult. Even installing solar hot water heaters in November in Te Anau meant dealing with a heavy snow fall during the install. That stretches timelines and budgets out.

“We rely heavily on local DOC staff for logistics,” she says, “When this stuff arrives on the island, you need boats, quads, and labour. Our staff are very busy, so we try to avoid the peak visitor seasons and the fire season.

“It needs good communication to try and minimise disruption to their schedule.”

**Judgements made**

There were no major departures from standard process.

**Critical success factors**

“One of the good things about working with EECA,” says Kathryn, “is that they know all the good suppliers in the industry. And because we have them on our tender panel, they make sure that we get, not only good systems, but good companies that provide support and liaison.”

“Certainly, Right House made it significantly easier for us, at the beginning by holding our hand the way it did. I was amazed at how much they went out of their way to help us when problems arose.

“The renewable energy industry is very small, but it’s very competent. I find them very professional – they really want to do a good job – and they want DOC on their CV.”

**What we learnt**

Kathryn says the Department hired a single contractor to carry out all the installations in a nationwide pilot solar hot water trial. “We wouldn’t do that again, because, given that one of the drivers for the programme is to reduce energy use, it made no sense to have one person travelling up and down the country time and time again.”
“But the other reason is that if there are any problems, it’s very difficult to get that person back to the job.

“Now, when we tender, we choose firms that have local subcontractors,” she says. “That way, the Area Office can develop a relationship with a local contractor, and if something goes wrong, they’re on the spot. It’s just a lot easier.”