Forestry Commission Scotland

usewoodfuel

LAKELAND SMOLTS LTD

Cairndow, Argyll

The first salmon hatchery in Scotland to utilise woodfuel to heat their large storage tanks. The Cairndow site produces 26 million eggs, 7 million salmon fry and 1 million salmon smolts annually. The conversion to woodfuel has dramatically reduced operating costs at the hatchery, which has been on site since 1975.

Why Use Woodfuel?
The hatchery process requires that the on-site water tanks be constantly heated, which allows the boiler to be run at optimal capacity for the majority of it's operating hours. The boiler is able to vary its thermal output to match the fluctuations in water temperature to maintain a constant heat within the tanks, maximising efficiency and minimising cost.

"2008 oil prices reached a record high, and once operational our woodfuel system saved the company £11,000 over a 19 day period, compared to the previous fuel costs."

Renewable Devices carried out an initial feasibility study of renewables options in the Cairndow area and other renewable systems were seriously considered. A woodfuel system was chosen as it offered a constant and controllable output at the most competitive cost. Woodfuel is a carbon lean renewable fuel that significantly reduces the carbon emissions from the hatchery.

System Accolades
The size of the boiler and the design of the fuel store allow the system to cope with a large chip size. The fuel store has a robust walking floor system that takes the chip from the store directly to the burner plate. The fuel is supplied at around 40% moisture content (MC), the system is able to cope with chips with a greater MC, but the calorific value of chips reduces with increased MC, and so more fuel deliveries would be required if fuel with a greater MC was supplied. To use fuel with a large chip size and higher MC, gives the customer good long-term flexibility in sourcing fuel into the future.

A specialised computer system means Lakeland Smolts can monitor the heat provision throughout the hatchery to ensure each stage of the process is accurately maintained at the required temperature. Renewable Fish & Chips, the Energy Services Company (ESCo) also monitors the system remotely via the internet and will respond to any alarms from the system to ensure continuity of operation and production from the hatchery.

All waste water is recovered on site, with approximately 1-2 MW of waste heat produced annually, recovering this water to preheat the tanks improves the overall system efficiency, further reducing energy and fuel costs.

Key Benefits of this Woodfuel Installation
// Constant source of heat during production season (Oct – May)
// Carbon emissions reduction
// Brand new reliable system
// Guaranteed energy price for 5 years through contract
// Reduction in energy costs

Heat Supply Contract
Renewable Fish & Chips, is contracted to provide heat for 5 years to the hatchery, at an agreed usage of approximately 2.5 GWh per year. The hatchery only purchases the actual quantity of heat used on-site. A heat meter measures usage and calculates the total number of kWh supplied by the ESCo.

The ESCo manages the fuel supply contract with Our Power, a wood chip supplier. It is in the supplier's interest to deliver as dry a fuel as possible, so as much heat per tonne of fuel is obtained. Heat sale contracts, compared to purchasing woodfuel by weight or volume, act to reduce the moisture content of fuel supplied so the number of fuel deliveries are minimised. The customer benefits by knowing exactly how much they are paying for their heat.

The boiler manufacturer, Mawera, provides regular servicing and maintenance to ensure continuous operation.

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Why operate with an ESCo?

// A large-scale commercial operation with constant demand for heat can accurately predict annual heat demand and benefit from a fixed unit price
// The hatchery purchases heat, not wood, which is easily measured
// The hatchery only pays for the energy it uses
// Moisture content of the fuel affects ESCo profit margins so it is in the interests of their fuel suppliers to reduce moisture content and supply quality fuel to minimise costs
// Long term fuel supply guaranteed for contract period
// Costs guaranteed for five years

Lessons Learned:

// For large developments, near residential areas, allow extra time for the planning process to account for queries
// Do not be over optimistic about the speed of construction, always allow time to complete the development
// Co-operative working with the Local Authority and regulatory bodies will reduce development delays
// Allow a reasonable period for the system to be commissioned
// Time restrictions on grant applications can add extra pressure, so seek advice from grant-awarding bodies at the earliest possible point
// Grant support from the Scottish Biomass Support Scheme was essential to fund the project

The planning requirements for biomass were fairly new to the local authority and technical information, particularly on boiler emissions, was required for planning approval. The interaction with the Scottish Environment Protection Agency (SEPA) was straightforward, with good correspondence maintained at all times to ensure the standards were achieved. Good communication at an early stage will prevent project delays.

BOILER	
Application	Water heating for Commercial Salmon Hatchery
Max output	850 kW
Manufacturer	Mawera
Fuel Type	Woodchip
Fuel specification	P45 (80% of chips are 45mm or less)
Moisture content	M40 (chips contain less than 40% moisture)
Installation date	March 2008
Operating period	24 weeks from October to May
Backup system	1.5 MW oil boiler
Energy consumption	2,500,000 kWh
Woodfuel store capacity	70 tonnes
Fuel delivery interval	Onsite chipping directly into the store occurs twice a week and produces 60 – 65 tonnes. Roundwood is delivered directly to site ready for processing
Woodfuel supply	Co-operative business located ½ mile from hatchery, sourcing material from within 30 mile radius
Project Supply contract	Feasibility: Renewable Devices Installation: Mawera UK 5 year fixed heat price through an Energy Services Company (ESCO) - Renewable Fish & Chips Fuel supply is from a community-owned wood chipping supply company, Our Power, part of the Here We Are project (www.hereweare-uk.com)
Weekly woodfuel use	Max usage is 100 tonnes per week.
Annual woodfuel use	Approx 1200 tonnes
INSTALLATION COSTS	
Boiler System	£450,000
Funding source	Scottish Biomass Support Scheme
Funding support rate	50% of additional costs of woodfuel system
COST SAVING	
CO2 savings pa	900 tonnes per year (when compared against oil)
Annual fuel cost saving	20% (when compared against oil)
Payback period	5-8 years