

Case Study: Clare County Council Headquarters

How the project was planned

In late 2006, as the construction of their new corporate headquarters in Ennis was underway, Clare County Council approached the CCWEP for assistance with investigating a wood energy heating system. CCWEP provided ongoing assistance in developing project options and by the summer of 2007 the Council had committed to the construction of a wood fuel boiler system to heat their new headquarters. This involved the Council in developing an understanding of the technology and the business case. Part of that process including visiting similar installations in another country.

As this was a new build project being developed under a 'Design and Build' contract with the construction company McNamaras, it afforded the opportunity to fully integrate a wood boiler system into the new development. McNamaras elected to appoint Clearpower Ltd (a specialist wood energy installation company) as the design and install subcontractor for the wood boiler. Large parts of the civils works associated with the installation were undertaken directly by McNamaras.

The system that resulted is a 540kW Kob Pyrot biomass boiler, burning wood chip. The wood chip is stored in an underground fuel silo that allows wood chip to be automatically fed into the boiler via a fuel transfer auger. The system has a gas boiler as back-up.

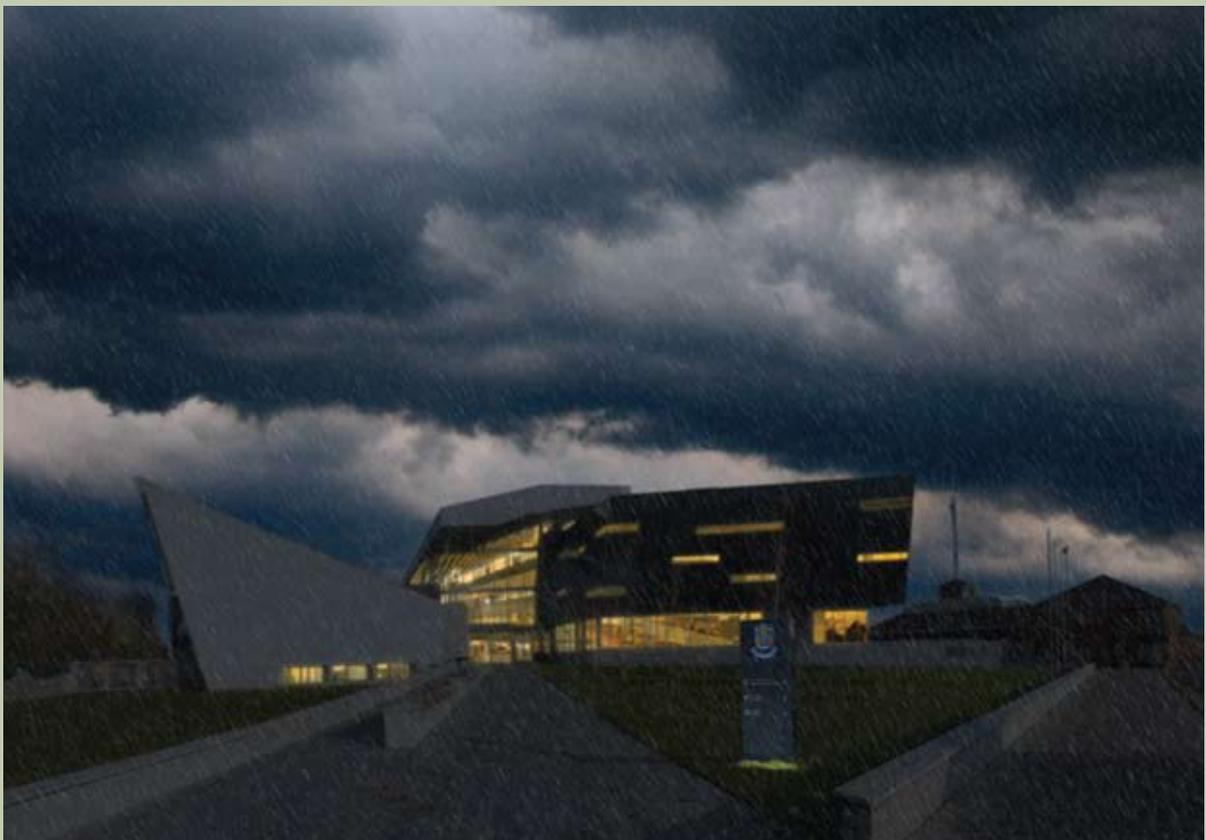
How the system works

The wood fuel is automatically moved from the underground silo by means of a feed auger that conveys the material to be burned diagonally from below into the firing system. The material to be burned is then ignited automatically by an electric heat gun. The ash falls into a moveable ash bin below.

The combustion gases rising from the combusted wood fuel in the combustion chamber are swept up by a rotating airflow. The thermal energy from the combustion gases is transmitted to the boiler water in a horizontally positioned pipe-type heat exchanger. A microprocessor control system adjusts the heat output of the furnace in a modulating fashion. It allows:

- Automatic ignition
- Modulating output operation (25–100%) so that low and high demands for hot water can be accommodated
- Automatic re-supplying of fuel by the feed auger from the silo
- Optimised air supply through motor-operated air vents for the best possible incineration, using a lambda sensor

The underground fuel silo allows tipping fuel delivery from a tipping trailer fuel delivery vehicle. This is an efficient and effective method of delivery. The silo has a capacity of 130m³, which gives a usable volume of 85m³. This is because the silo is designed with a cone shaped bottom to allow fuel to drop into the augers and because it should have an air gap at the top to ensure the fuel does not become anaerobic and start to decompose. At the maximum specified moisture content of the fuel (at 45%) this is equivalent to 23.5 tonnes of wood chips when full. This amount of fuel equates to approximately 100 full load hours of heat for the boiler. Therefore, during peak heating months the silo will require filling every 10 days.



How the fuel is sustainably supplied

Following a competitive tender process managed by the CCWEP, the County Council entered into a heat supply agreement with Clare Wood Chip Ltd based in Flagmount in the north east of the county, who supplies all the wood fuel and takes away the ash. The fuel supplier is paid in €/kWh as measured by a heat meter. This means the fuel supplier is fully responsible for the energy content of the wood chips and the County Council only pays for the actual energy it uses.

The boiler will use an estimated 375 to 400 tonnes of conditioned wood chips per annum. This is equal to 550m³ of round logs. This material is sustainably sourced from locally owned plantations. The delivery distance is 27 miles. The fuel supply is planned on a five year cycle and a total of 135 hectares of forestry is required to ensure that the five year fuel cycle is met¹⁵.



How the fuel is dried

The timber from forest thinnings is harvested as small diameter logs and transported to the local wood fuel depot in Flagmount. Here the logs are stored outdoors with the cut ends facing south so that the prevailing wind can penetrate the timber stacks. The stacks are also covered with a reinforced, recyclable paper cover to prevent rainfall wetting them.

Fresh timber logs have a moisture content of 50–55%, so the logs must be air dried down to a suitable moisture content of 30–35% before they are chipped. The time required to achieve this is about nine months, although this depends upon site specific factors and climatic conditions. Once the desired moisture content is achieved, the logs are chipped using a fuel wood chipper (Musmax) and stored in a dry shed for onward delivery with a tractor and trailer to this boiler and other customers locally.