

ORC AS CHP

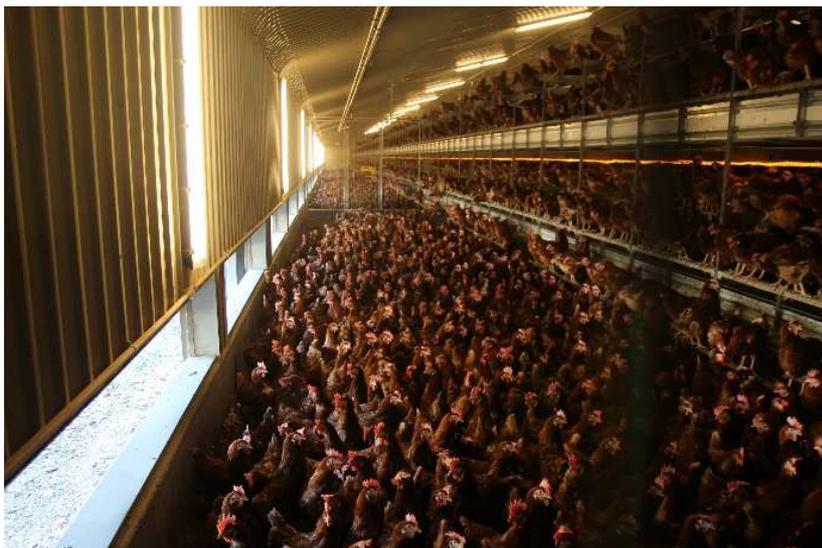
E-RATIONAL ORC 20FT – 750kW_{TH} – 90kWe

Glenhead of Aldouran Farm is a free range hen layer farm in Stranraer (Scotland). In addition to daily fresh eggs, the 128,000 birds produce enough chicken manure to fire a 750kW_{th} fluidized bed biomass boiler which feeds an E-RATIONAL ORC UHT 111/90kWe unit.



The biomass boiler produces 150°C of hot water, to provide 750W_{th} of heat to be recovered by the ORC. The ORC unit produces **power & heat**. The average electrical power of 65kWe is used on-site for local consumption. Because the area is suffering from regular power cuts, the ORC machine is equipped with an off-grid cabinet. In case of power outage, the ORC can run in island mode. A diesel generator is used as emergency unit to assist the ORC and the on-site wind turbine for the power generation.

The condenser side of the ORC runs on warm water with an average temperature of 65°C. The warm water returning from the ORC is used to heat the chicken sheds of the sites. A distribution system brings the heat to the different henneries. In this way, 100% of the heat generated by the boiler is valorised either as power, either as heat itself.



James Baxter, owner of Glenhead of Aldouran Farm: "This biomass project gives me a multiple win: the chicken manure is processed and the boiler ash can be reused as fertilizer because of the nutrients remaining in it. The electricity can be used on site to save on the power purchase. And the chicken sheds are heated with the condensing heat of the ORC. Therefore, I do not need an extra wood chip boiler to heat the sheds separately. An additional advantage is that **I am now fully independent if something happens with the grid connection**".



Left: ORC UHT 111/90kWe – Right: fluidized bed biomass boiler

Heat to be recovered	Hot water from a chicken manure biomass boiler
Working temperature hot side	150°C → 135°C
Thermal load at hot side	± 750kWth
Condenser	45°C → 65°C
Drying capacity	± 685kWth
Cooling	Heating of chicken sheds
Total installed generator capacity	90kWe
Average net power production	65kWe
In operation since	2018
Running hours per year	± 8.000 hours
Support scheme	No

Machine definition Glenhead of Aldouran Farm Stranraer

E-RATIONAL is delivering a cost-effective solution to convert low temperature waste heat into clean energy without emissions. Our state-of-the-art **Organic Rankine Cycle (ORC)** technology, with in-house development of the expansion part and the use of industrial grade components, makes E-RATIONAL's ORCs user-friendly, robust and economically viable. The E-RATIONAL ORC has been designed to maximize uptime and efficiency with a minimized operational and maintenance cost. This results in a containerized modular machine, CE-compliant, with plug-and-play connections for easy installation.

The ORC machines can convert heat from various sources, such as:

- Industrial processes, e.g. cooling cycles at chemical plants, glass, steel or food industry, power plants, etc.
- District heating networks (unused excess heat)
- Biomass burners or biogas installations with CHP units
- Low temperature geothermal wells

E-RATIONAL's technology is suitable for heat recovery of feeding temperatures at maximum 170°C (338°F) and minimum 85°C (185°F) at the hot side. Typical temperature difference between inlet and outlet is 20°C. Cooling temperature sent to the machine can be maximum 60°C (140°F), depending on the temperatures at the hot side.

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