Company Name and Contact Details:

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The National Institute of Water and Atmospheric Research (NIWA) is a Crown Research Institute focusing on water and atmospheric research. The Aquatic Pollution Group at NIWA Hamilton has conducted research on improved pond systems for wastewater treatment for over 20 years. For the last 12 years they have developed and calibrated the High Rate Algal Pond (HRAP) wastewater treatment and algal production technology for New Zealand conditions. These shallow, paddlewheel-mixed open raceway ponds achieve far more efficient wastewater treatment than conventional oxidation ponds primarily as a result of intense algal photosynthesis providing saturated oxygen to drive aerobic treatment and assimilation of wastewater nutrients into algal biomass. The shallow pond depth and continuous mixing of HRAP assist with disinfection of the wastewater by sunlight. HRAP are also much more cost-effective than energy intensive mechanical wastewater treatment systems providing similar wastewater treatment.

Over 90% of worldwide commercial microalgal production is produced in HRAP. NIWA has pioneered CO_2 addition to wastewater HRAP for enhanced treatment and algal production. NIWA is presently conducting fundamental research on algal production, harvest and biofuel conversion (biogas, bioethanol, biodiesel and bio-oil) with industry partners. A 5 ha demonstration-scale HRAP with carbon dioxide addition will be monitored over the next 3 years at Christchurch wastewater treatment plant. Algae will be converted to bio-oil in conjunction with Solray Energy Ltd.

NIWA has also developed the Covered Anaerobic Pond (CAP) to cost-effectively recover energy from wastewater biomass as biogas methane. Research on CAPs over the last 5 years has demonstrated equivalent biogas production to more expensive heated, mixed digesters. CAPs can be easily used to retrofit existing anaerobic ponds used on farms or by industry. CAPs can be combined with the most appropriate biogas use option at a site, which depending on the size of the installation, could be one or a combination of: heating/cooling; combined heat and power; vehicle use.

Core Skill(s):

- Fundamental research on algal production, harvest and biofuel conversion
- Desk-top studies on suitability and economics of HRAP for wastewater treatment, CO2 biofixation and biomass use as fuel, feed or fertilizer.
- Pilot and Large-scale demonstration of HRAP and CAP technologies with industry partners
- Design of HRAP for wastewater treatment and or algal production
- Design of CAP for biogas recovery from wastewater

Biofuel Focus:

- Biogas; Bio-oil; Biodiesel; Bioethanol

Core Product/Activity:

- Integrated energy efficient wastewater treatment and resource recovery systems
- High Rate Algal Ponds
- Covered Anaerobic Ponds

Key Project Activities:

- Pilot and Large-scale demonstrations of HRAP and CAP technologies

Leading Edge:

NIWA has pioneered CO_2 addition to wastewater HRAP for enhanced treatment and algal production and has over 12 years experience with the design and operation of HRAP in New Zealand. NIWA has developed the Covered Anaerobic Pond (CAP) to cost-effectively recover energy from wastewater biomass as biogas methane and has 5 years experience with working with end-users to apply this simple technology.

Investment Base:

- New Zealand

Employees:

Production Capacity

Algal biofuel feedstock