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Ecosystem health report card grades demonstrate the reduced assimilative capacity of Qld waters with respect to nutrients and toxicants found in treated effluent.

It is recognised that much needed development and growth is dependent on options for the sustainable disposal of treated effluent.
What’s happening around Queensland?
Townsville CC and Burdekin SC

Macro-algae trial:

Partnering with JCU and MBD Energy
Gladstone RC

(Woodchip) Bioreactor
Construction for bioreactor trials underway near Giru

EARTHWORKS have begun on a cane farm near Giru where a bioreactor is being constructed as part of a trial to help improve water quality in the Great Barrier Reef.

Minister for Agricultural Industry Development and Fisheries Mark Furner said the trial would test if bioreactors in a tropical environment could stop excess nitrates in water leaching farms and flowing into the Great Barrier Reef.

"Denitrification bioreactors are a low cost, practical solution to water quality problems," Mr Furner said.

"Similar bioreactors operating on horticulture farms in southeast Queensland have been able to significantly reduce nitrate levels in shallow groundwater.

"The site chosen for this first bioreactor is a cane farm adjoining the Haughton River near Giru."

"Excavation is underway at this first trial site, with a further two bioreactors to be trialled at other sites likely to be in the Haughton River and Brandon areas.

"It will take a couple of days to excavate the trench, fill it with woodchips and install the covering to secure the bioreactor.

"It will then start operating after the first irrigation or rainfall event. We'll monitor the water quality entering and leaving the bioreactors over the next couple of years to determine just how much nitrate they are removing from the water.

"By tackling these challenges today we can ensure they don't become an even larger problem for future generations to deal with."

"The government can't solve these problems acting alone. That's why we work in partnership with the community, business and industry. In this case we have partnered with the Queensland University of Technology (QUT)."

Minister for Environment and the Great Barrier Reef Leeanne Enoch said improving water quality would provide great benefits to the Great Barrier Reef.

"The Great Barrier Reef is Queensland's greatest natural asset and it is vital we support innovative new ways to protect this natural wonder," Ms Enoch said.

"The Palaszczuk Government has committed $26 million over five years for the Queensland Reef Water Quality Program, which invests in on-ground water quality improvement projects.

"A strong focus of this program is innovation and working with landholders to reduce pollutant run off into local waterways.

"It is great to see technologies, such as these bioreactors, being used as practical solutions to help improve water quality for our valuable Reef."

Department of Agriculture and Fisheries project leader Carla Wegscheid said bioreactors were trenches filled with either softwood or hardwood chips, which intercept ground or surface water.

"They enhance the natural denitrification process by converting nitrate into inert nitrogen gas, which is lost to the atmosphere, and stop nitrates entering the Great Barrier Reef," she said.

"The bioreactor trials are a collaboration between the Department of Agriculture and Fisheries and the Queensland University of Technology (QUT)."

"QUT is leading the design and monitoring components of the project."

The project is funded by the Queensland Government's Great Barrier Reef Innovation Fund under the Queensland Reef Water Quality Program.

Works for a bioreactor trial have begun on a Giru farm.
Redlands CC

Dechlorinator
Unitywater

Diatom (micro-algae) trial
WASTE TO ENERGY
AT A SEWAGE TREATMENT PLANT

FROM ENERGY REDUCTION
TO ENERGY NEUTRALITY
Currently working with ARENA on W2E proposal at Kawana STP

Utilise the anaerobic digesters at existing STPs to co-digest liquid organics

Provide adequate flexibility to avoid ‘cherry-picking’ of FOG waste

Develop infrastructure for the receival, storage and blending of FOG waste

Define energy benefit

Transform business operations to manage new stream

Share learnings (ARENA).
Queensland Urban Utilities

• Water Quality Offsets
  – Beaudesert Pilot Project, Now 3 years old
  – Laidley Creek Project, commenced mid 2017
• Biofuels and Waste to Energy (W2E)
• Sludge Reed Bed Trial with Water and Carbon Group at Wacol STP
• Floating wetlands
• Innovation centre
Beaudesert Pilot

Site 1 – Was

Site 1 – 70% complete
Beaudesert Pilot

Site 1 – 85% Complete

Site 1 – 85% complete
Beaudesert Pilot

3 Months

2 Years
Beaudesert Pilot Resilience

Before Ex-TC Debbie

After Ex-TC Debbie
Beaudesert Site Reference

Before Ex-TC Debbie

After Ex-TC Debbie
Laidley Creek – Bank Erosion
2050 metres of Laidley Creek bank restoration

Three private land owners

Soft engineering
- Grade control in creek
- Minor toe revetment (rock)
- Bank battering to 35 degree slope
- Revegetation native local trees and shrubs
Increase Renewable Energy Generation
- 33% onsite power generation and use
Reduce Energy Consumption

Fuel crops irrigated with treated waste water
Layout of full-scale if implemented
Functions of Sludge Treatment Reed Beds

STRBs serve multiple functions
1. Dewatering (gravity draining & evapotranspiration)
2. Passive aeration
3. Mineralisation & composting
4. Storage (10 to 20 yrs)
5. Filtrate treatment
Sample Reference sites of full scale STRBs:

**Sorø STRB (Denmark)**

Sorø Sludge Treatment Reed bed System
550 tonnes of drysolids per year - 10 basins
Esbjerg STRBs (Denmark)

Esbjerg STRB is the largest system in Denmark (Consultant: NIRAS)
WWTP east (125,000 PE)
WWTP west (290,000 PE)
2,800 tons ds per year
• Floating wetlands

Plant roots provide a very large surface area for nutrients to be absorbed.

A sticky biofilm (complex mass of micro-organisms) covering the roots helps trap fine particles and absorbs nutrients from the water.
• Innovation Centre:
The End
(or perhaps only the beginning?)