

The Bio-Regen - a revolution in food waste management

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Overview

The Bio-Regen system

1. The system and how it works
2. Implementing the system
3. Barriers and constraints
4. Benefits
4. Future projects
5. Summary of learnings

Bio-Regen™

Value From Unused Food



The Bio-Regen system



JCU is the first University in the world to install a Bio-Regen system

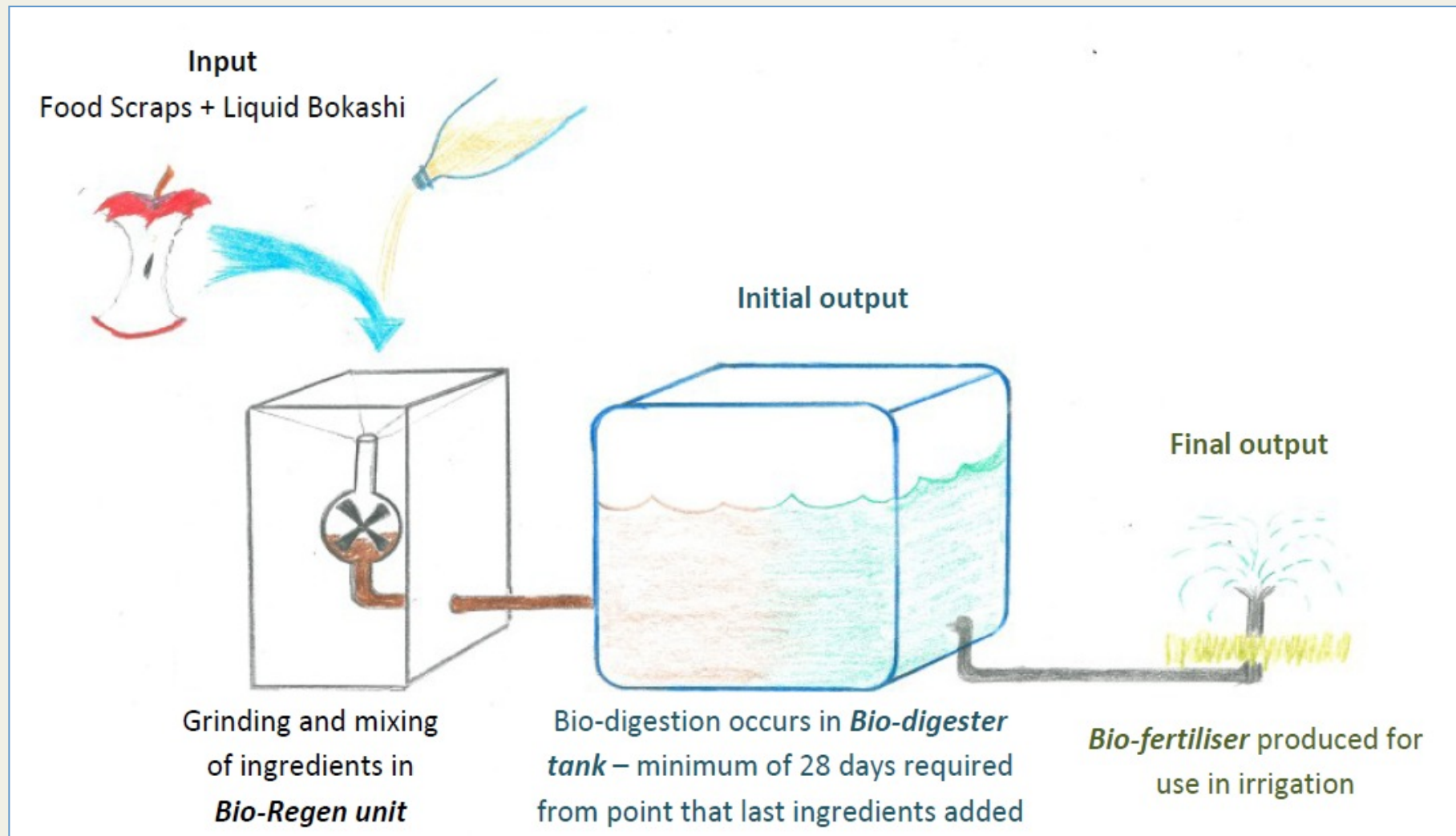
Installed as a trial in Uni Halls kitchen:

- college caters for over 300 staff and students
- 3 meals a day for most of the year
- Estimated at over 20 tonnes of food waste produced per year

Creating value from waste

How does it work?

The Bio-Regen system





Simple to operate

- 5 easy steps

- Designed to ensure hands on engagement with operators
- Very visual and users get a better understanding of how much food is being “wasted”
- Human involvement with the process is essential for driving changes in behaviour

Operation instructions

• Step 1- Fuel up

- Check the manual for more info.

• Step 2- Collect food scraps in the bucket

• Step 3- Feed the Bio-Regen unit

- **Never use your hands to feed the unit**
- Use the plunger to push material down
- Stand on the right pedal of the unit and hold it down while feeding the unit

• Step 4- Wash the bucket

- Tip the bucket upside down over the sink
- Stand on the left pedal (10 seconds)
- Release the pedal Before removing the bucket

• Step 5- Check the lines are flushed

- Hold down the right pedal until the lines are clear

The Bio-Regen system

- Simple, clean and effective process of managing large volumes of food waste – suitable for commercial kitchens
- Food waste is converted to a liquid bio-fertiliser by a special mix of “Bokashi” microbes
- Kitchen has already produced 14,000L of bio-fertiliser since February
- Skip bin collections reduced to three days per week from five (potential to reduce further)
- Reduced waste to landfill by 7 tonnes to date
- Savings of 6.3 tonnes CO₂-e emissions to date (not including transport)

What can go in it?

- Most food wastes - anything you can eat
- Vegetables, fruit, meat, fish, legumes, grains, sauces
- The greater the variety the better the end-product

What can't go in it?

- Avoid large volumes of fibrous materials
- Uncooked bones
- Large seeds (e.g. avocados)
- Avoid chemicals (kills the microbes)



Bio-Regen

If it could go in you it can go in me!



FUEL 1

VRM POWER CLEAN

Left Hand Fuel Cap on the
Top Left of the Unit

How much to use:
500ml per month or as
required

(Refer to your Manual)

WARNING

Never Put Your Hands In
The Unit



Non-Potable Water
Do Not Drink



FUEL 2

BIO-REGEN BOKASHI

Right Hand Fuel Cap on the
Top Right of the Unit

How much to use:
500ml per week or as
required

(Refer to your Manual)

Implementing the system

- Jun – Nov 2011 - Pre-implementation works and planning (Janet's presentation)
- February 2012
 - Unit installed
 - Staff training/inductions
 - Commenced operation and trial period
- April 2012
 - Official launch - VC Prof Sandra Harding
 - Supply staff and students with bio-fertiliser samples
 - 4,000L bio-fertiliser produced
- August 2012 - Casual project officer appointed to help roll out Bio-Regen related projects
- September 2012
 - Sales of bio-fertiliser commence
 - Soil sampling program set up to monitor soil carbon and moisture levels
 - 14,000L bio-fertiliser produced



Implementing the system

– Casual Project Officer

- Casual staff member to run projects – jointly funded by JCU and VRM
 - JCU Masters student – one day per week
- Conduct various tasks:
 - Soil testing in preparation for addition of bio-fertiliser through irrigation
 - Work with grounds staff and student association
 - Set up and run sales of bio-fertiliser to JCU and wider community
 - Liaise with kitchen staff on a weekly basis
 - Collect and collate data relating to inputs and outputs of the system
 - Develop relationship with local farmer/s and create an MOU to supply bio-fertiliser in exchange for produce
 - Develop research projects and seek funding to carry out

Implementing the system

- Selling the bio-fertiliser

- 15L containers of bio-fertiliser can be purchased through TropEco program
- \$30 to purchase first container which entitles users to 4 free refills (must return container)
- Provides great value compared to other commercially available bio-fertiliser (e.g. Seasol)
- Encourages container stewardship



Implementing the system

- Selling the bio-fertiliser

- Bio-fertiliser is highly potent and should be diluted at least 1 in 10 or more
- Works great on my veggies and plants – I've always killed my plants in the past!!
- Customer satisfaction is the ultimate endorsement and may drive up the value of the product over time if popular



Barriers and constraints – working with staff

- Kitchen staff are the key to the system's success - need to have acceptance and support
- Originally allowed all kitchen staff to use machine as required
- All staff inducted and shown how to use system
- Issues with breakdowns being caused by malicious/careless staff members
 - Pump being blocked by new staff not flushing the lines correctly
 - Intentional sabotage of machine suspected in some cases



Solutions

– working with staff

- Changed system and allocated “Champions” to take ownership of the system
- “Champions” were given a key to the unit and were the only ones allowed to turn on and operate system
 - Breakdowns decreased significantly
- “Champions” given incentives for their role
 - Shopping vouchers and TropEco shirts offered as incentives to be a “champion”
 - Additional incentives offered for no breakdowns over a certain time period

Solutions

– working with staff

- Increased communication and feedback to staff – weekly, informal discussions with Project Officer
- Schedule changed to two sessions per day rather than ad-hoc
- Better record keeping – record Bokashi additions, usage, breakdowns, and volumes processed
- Staff offered free bio-fertiliser for personal use
- Media exposure for staff/kitchen and recognition from senior management
- Endorsement by Costa Georgiadis during visit to JCU

Uni food waste fertiliser move

by Daniel Bateman

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JAMES Cook University has become the first university in the world to install a machine that transforms food scraps into fertiliser.

A \$6500 Bio-Regen unit has been installed in the kitchen at the University Halls of Residence.

JCU joins Hermit Park State School in using one of the machines.

The machine, which was designed in Townsville, converts food waste to a fertiliser, and is capable of producing up to 250kg

of re-usable waste product each day.

Every year, JCU's kitchens, including its private colleges, produce close to 100 tonnes of food waste. This results in 380 tonnes of carbon dioxide equivalent emissions when sent to the landfill – as much as 84 cars on the road for a year.

The instant food conversion unit was developed by Townsville based company Vital Resource Management, founded by Ken Bellamy.

The unit itself is about 1.5m tall by 40cm wide, resembles a stand-alone garbage disposal unit, where leftover food is forced down a drain with a stream of water and a plunger.

It is then ground up twice,

before being pumped out into large containers, stored outside, where bacteria naturally breaks the food down further over 28 days into a product similar to apple cider vinegar.

The liquid is then further processed into a bio-fertiliser.

The kitchen will save more than \$5000 in waste removal costs, and will instead have a product that can be used across campus gardens, or sold to farmers.

JCU environment manager Adam Connell said the machine would go a long way helping the university recycle its food scraps.

More units are planned to be rolled out across Douglas campus.



TRANSFORMED: VRM's Ken Bellamy with JCU catering manager Alexis Buckley Photo: WESLEY MONTS

Scraps success

THERE is something in the water that is making people happy at James Cook University.

University Hall chef Chad Simpson and his team were the first to trial a new Bio-Regen waste recycling system that has saved one tonne of food waste from landfill in just weeks.

Hungry microbes were added to water and to blended food scraps to turn kitchen waste into nutritious fertiliser, helping to remove the health and safety risks involved with rubbish disposal.

"Rather than filling a bin, it is good to be able to recycle it (the scraps)," Mr Simpson said. "The bins did get quite heavy, now we just fill up a bucket."

Fertiliser produced by the system can be used on-

campus or sold back to the supplier.

Mr Simpson said the waste from the trial should keep their herb and vegetable garden healthy.

JCU's environment manager Adam Connell said the trial was a world first.

"The technology is from a local company that supplies microbe products," he said. The only things that couldn't be recycled by the trial were bones, hard shells, packaging and fibrous materials.

The scrap mixture is pumped into a tank outside the kitchen and remains there for up to a month while waste materials are digested by microbes.

The free by-product used to fertilise school grounds will also reduce the university's irrigation costs.



Uni Hall Chef Chad Simpson with the Bio-Regen system

Barriers and constraints

– Odour issues

- Initially had odour issues due to lack of Bokashi being added to system
 - Food rotting in tanks due to lack of correct microbes
- VRM set up an odour control system on tanks and ensured a regular program of Bokashi additions occurred
 - 500mL per day, recorded by staff
- Much reduced issues now, consistent quality of end-product

Benefits

- Helps identify wasteful practices

- Gives kitchen staff a visual indication of the wastefulness of their practices
- Already seeing a net reduction in total food waste produced from kitchen
- Can calculate financial cost of disposing of food waste
 - e.g. average cost of \$10/kg of produce and 20 tonnes per year being thrown away = \$200,000 being disposed of as waste
- Less likely to identify this if not handled directly by staff
- Staff happy with reduced manual handling of heavy bins

Benefits

- Short payback period

- Original plan had a payback period of less than 2 years
- Currently expecting approximately 3 years due to trial process
 - Current waste collections 3 days per week but being conservative during trial period
- Future projects will be faster payback period due to learnings of trial program
- Profits from sale of bio-fertiliser not calculated
- Water savings from improved soil structure not calculated but will be once trial starts
- Potential to gain carbon credits for soil carbon sequestration in future

Benefits

- Collaboration with others

- Video conference with Malaysian school
 - VC for launch of Bio-Regen at school in Penang
 - Builds links with JCU, potential future International students
- Link up with Townsville schools who have installed systems
- Provide tours for interested groups
 - Zero Waste Australia
 - International visitors
 - Other Universities
 - Reef Guardian Schools program

Benefits

- Collaboration with others

- Link to community by providing bio-fertiliser to local groups
 - Provide to Permaculture Townsville and local Landcare group
- Get JCU students involved with process
 - Nominate a student champion and get involved with processing food and communicating to other residents
 - Helps improve relationship between kitchen staff and residents
 - Better understanding of food waste produced by residents



Future Projects

- Bio-Fertiliser additions to grounds

- Add to campus gardens and lawns through irrigation from existing recycled water tanks
- Add to AFL oval and evaluate improvements to soil and reduction in water use
- Regular soil sampling conducted including baseline measurements
- Keep records for potential to claim carbon credits in future
 - Extensive land area to create soil carbon gains on campus



Future Projects

Linkages with farmers - closing the cycle

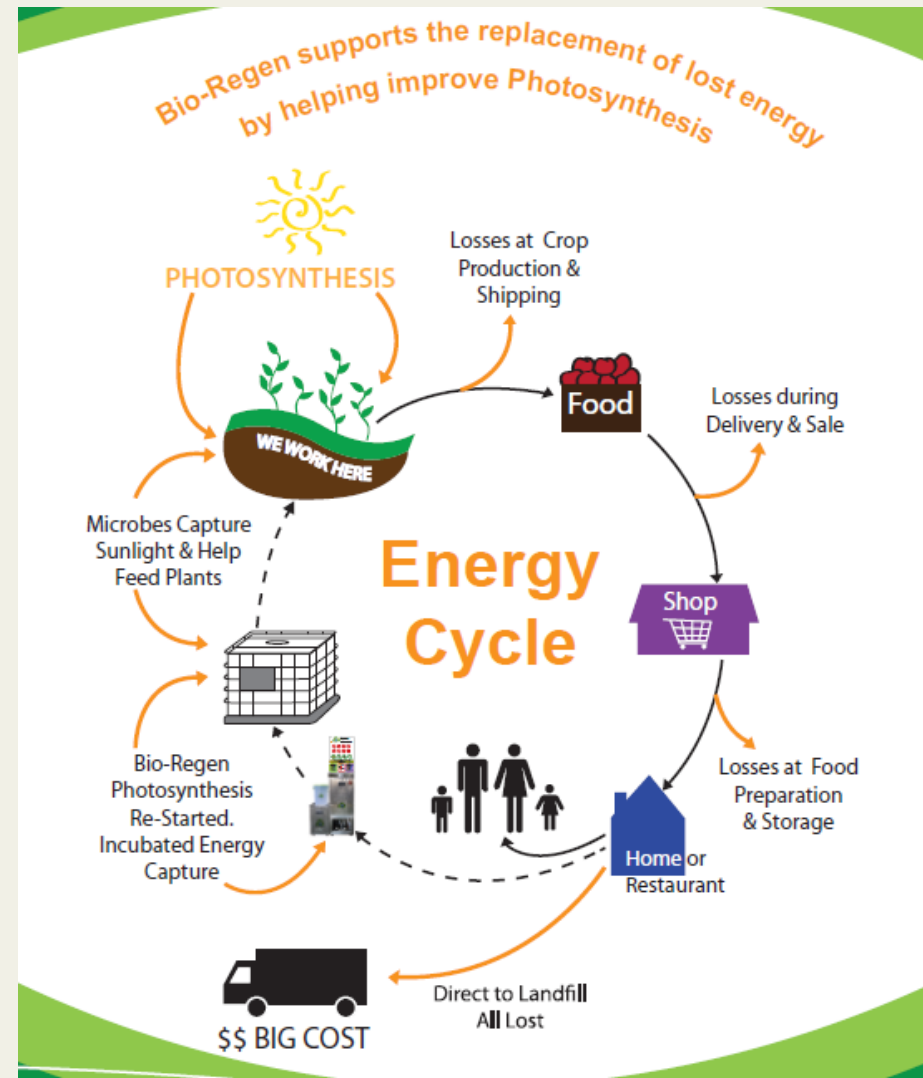
- Develop linkage with local farmer/s
- Supply bio-fertiliser in exchange for produce to the kitchen
- No money exchanges hands – just an MOU between JCU and the farmer
- Closes the food cycle with zero food waste produced and nutrients cycle back to the farm



Future Projects

- Carbon sequestration and soil improvement

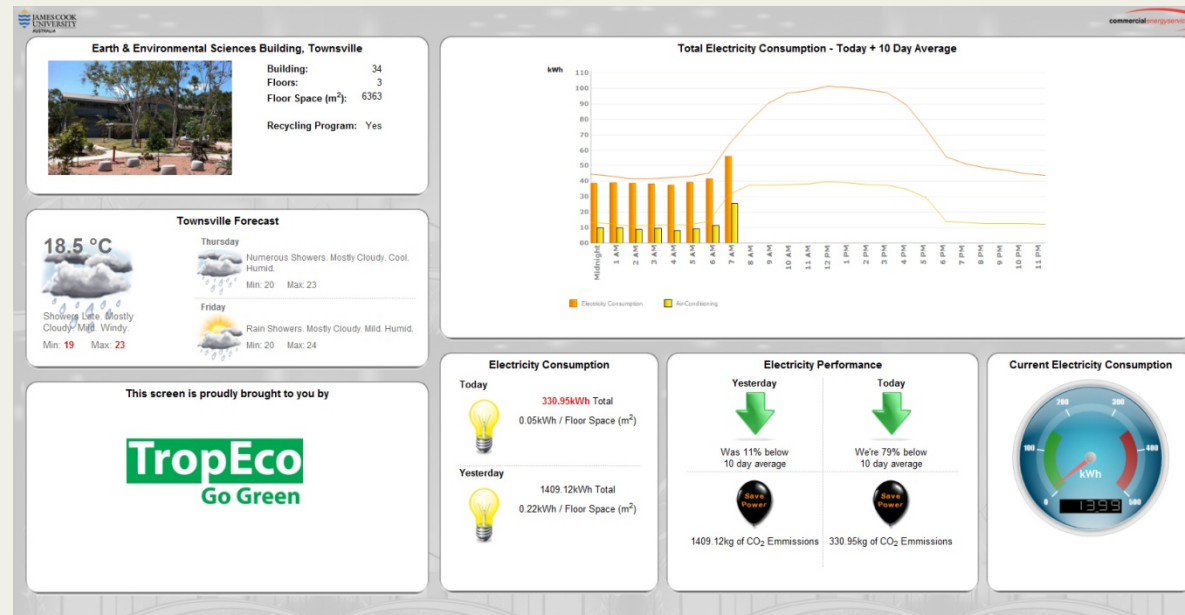
- Photosynthetic microbes build carbon in soils
- Long term process but measurable over time
- Farmers in Burdekin and Herbert seeing results from use of microbes over several years
- Improved water holding capacity in soils
 - Townsville City Council reduced irrigation costs by millions of dollars each year
- Additional research required to fully evaluate benefits



Future Projects

- Dashboards

- Plans to have an interactive dashboard in each kitchen with a Bio-Regen
 - Video conference with or watch other machines over webcam
 - List usage data for each machine (food processed, water used, etc...)
 - Bulletin board for Twitter like comments from users



Future installations

- Success of system and fast payback period resulted in future installs planned for 2013
- JCU has eight major kitchens that could host a Bio-Regen system
- Next install to be at Cairns Campus refectory, with linkages to the JCU Permaculture Society already being formed for use and sale of bio-fertiliser
- Potential to become a food waste free University
- Up to 100 tonnes of food waste per year could be converted to 200,000L of bio-fertiliser

Summary of learnings

- Kitchen staff are the KEY to successful implementation
- Process is simple, clean and effective for handling large volumes of food waste
- Many value adding processes – not just food waste management
 - Bio-fertiliser used on grounds
 - Build relationships with local farmers and community groups
 - On-selling of bio-fertiliser
 - Great demonstration system
 - Linkages with schools and others using Bio-Regen
 - Reduce carbon emissions
 - Improve soil and plant health and reduce water consumption
- Implement in stages to ensure process runs smoothly
- Have a plan in place for the use of bio-fertiliser before starting
 - VRM can help with this

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