

Clean technology leading the way in sustainable nutrient management, on-farm and off

Boost Environmental Systems' IMPACT treats dairy manure quickly and efficiently, bi-products creates value-added revenue streams BY DIANA MARTIN

A CUTTING-EDGE NUTRIENT management technology out of British Columbia is showing its potential to revolutionize dairy manure management and sewage sludge management.

"The management of wastewater streams is a huge environmental problem and there is an immediate need for a solution in both sectors," said Dr. Asha Srinivasan, at the Mitacs Global Impact Entrepreneur Awards June 8 in Toronto.

Boost Environmental Systems, an up-and-coming company created by Srinivasan, Dr. Sergey Lobanov and IMPACT process co-inventors Dr. Victor Lo and Dr. Ping H. Liao, were one of five winners recognizing sound business planning, entrepreneurial spirit and commitment to continued excellence in innovation.

Developed in the University of British Columbia's labs, IMPACT uses a microwave peroxide acceleration conversion process to break down solids and recover nutrients and energy from organic slurries, before they pose a problem.

A 25-kilowatt industrial-sized version of the clean-tech system is currently involved in a pilot project at UBC's Dairy Education Research Centre in Agassiz, B.C.

Cows have a very effective digestive

system which expels hard to break down fibres, said Srinivasan. In spite of that IMPACT's synergist effect between microwave irradiation and hydrogen peroxide disintegrates the solids and releases insoluble nutrients into soluble form. The result is a 60 percent clarified super liquid, rich in nutrients and short-chain organic molecules, with the remain solids dropping to 40 percent.

With increasing pressures from government regulations regarding land application, soaring land prices and the encroachment of urban development on farmland, North America needs a sustainable manure management solution.

IMPACT is capable of reducing the volume of manure by 50 percent, easily digest third party fats, grease and oil, divert excess nutrients away from land application, produce biogas, increase anaerobic digester capacity while simultaneously creating carbon credits and reducing the carbon footprint of a facility. It also has the potential of a value-add revenue stream for producing a valuable commercial grade fertilizer from waste.

"We are providing a sustainable sludge management solution that will reduce the carbon footprint of wastew-

ater treatment plants," she said. "And giving dairy farmers a viable way to manage land application of manure without contaminating local water supplies."

Anaerobic digesters cost approximately \$10 million, said Srinivasan, adding, investing approximately \$500,000 into the IMPACT system can actually save money and increase revenue. Although rare to be found on a farm, Seabreeze already had one installed in an effort to find environmentally sustainable methods to mitigate their waste.

Boost is running a feasibility project at the 275 lactating cow facility. Seabreeze brings in off-farm organic waste such as fat, oil and grease, as an add-on for the production of biogas, which they then sell to FortisBC.

Srinivasan said by pre-treating the substrates through IMPACT it speeds the conversion of complex organic molecules into volatile fatty acids, often the step that bottlenecks the flow of material into the anaerobic digester because of the 25 to 60 day retention period. Which slows biogas production.

Most dairy facilities can't afford the investment into an on-farm anaerobic digester but Srinivasan sees the potential of central nutrient management facilities

being a co-op investment for local dairy farmers with under 100 lactating cows.

“A centralized waste processing facility that can treat the manure and generate value-added products, like a commercial grade fertilizer or biogas, at the same time,” she said, adding hog manure could also be accepted. “I really see that could be the future, especially if you see an area that is dominant with dairy farms.”

Combining IMPACT with Struvite Crystallization and an Anaerobic Digester on a farm with 120 lactating cows could prevent 2.7 tonnes of phosphate a year, preventing excess nutrient build-up in the soil and reducing greenhouse gases by approximately 1700 tonnes of CO₂. At the same time it could generate 19 tonnes of struvite with sales worth \$23,000 to \$50,000 yearly.

The same applies for municipalities, especially smaller rural ones who are faced with multi-million dollar upgrades to their infrastructure to meet new regulations regarding the treatment of wastewater.

Unlike some of the European competitors who are trying to break into the market, IMPACT has scalability that moves easily from on farm into wastewater treatment centres for small towns with a population of 1,000 to larger city centres like Toronto and Vancouver.

Srinivasan said the water treatment centres in Metro Vancouver and Abbotsford B.C., will be participating in a pilot project with IMPACT to test how seamlessly it integrates into the existing anaerobic digester systems.

Because IMPACT is so scalable it allows municipalities to upgrade their anaerobic systems to deal with larger capacity without having to double the size because of how effectively the clean technology breaks down solids and creates soluble products.

The payback timeline can be as shorter than five years with Boost’s technology, she said.

“These treatment plants pay some-



• Dr. Asha Srinivasan, of Boost Environmental Systems, was in Toronto to receive an award during the Mitacs Global Impact Entrepreneur Awards June 8 for the IMPACT system which uses microwave-peroxide technology to break down solids and recover nutrients and energy as part of a nutrient and sewage sludge management

one to come and take it (biosolids) from that site, they are paying for trucking cost, hauling cost and they are paying for the land application,” Srinivasan said. “If we are able to reduce the volume of biosolids going out of their site it’s a huge operational saving for them.”

IMPACT can reduce the volume of disposable sludge by over 70 percent while improving the biodegradability.

If a municipality invested \$800,000 to \$1 million into an IMPACT system to serve 100,000 to 200,000 people it would see an average saving of half a million dollars just in operational cost. It would also see a savings of \$10 million in process upgrades because IMPACT will increase the efficiency of existing or same-sized anaerobic digesters. It can sterilize biologically active waste streams and produce Class A biosolids for land application.

Srinivasan said Boost is aiming to release a commercial ready version of IMPACT sometime in 2019 but feels the pilot projects on the UBC farm and in the wastewater treatment capacity streams will do a lot to move their cause forward.

“We are really targeting towards the wastewater sector because we have

these two huge demonstrations, and municipalities are very much interested,” she said, adding it’s an easier sell with solid technical feasibility data. “We hope that one of (the cities) becomes our champions in terms of really promoting our case and going to the news saying what we have is environmentally sustainable.”

They have already has significant interest from China, India and South East Asia.

Boost Environmental Systems received \$5,000 from Mitacs Global Impact Entrepreneur Award for addressing such a pressing global issue.

The award is judged on sound business planning, entrepreneurial spirit and a commitment to excellence in innovation.

“Mitacs is building on Canada’s strengthened commitment to technology and innovation by continuing to support up-and-coming entrepreneurs, like Asha,” said Alejandro Adem, Mitacs CEO. “Mitacs’ programs equip researchers with the career skills they need to successfully transfer breakthrough technologies, community and educational improvements, and environmental solutions from the lab to the business world.”