

**GREEN RECIPE**

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**Food Waste + Cow Manure = Electricity***story and photos by Laurie Mercer*

If, once you arrive at the gates of heaven, you are confronted with all of the waste you produced in your lifetime, 40% will be uneaten food. Destined to become food waste, we inhabit a world of never-ending left-overs. One time edibles (produce and packaged) are the single largest contributor to municipal landfills. Plucked from the stream of decomposition, federal and state mandates controlling landfills are beginning to stem the tide. Two common alternatives are incineration and compost.

In parts of the Finger Lakes, a third solution is turning on the lights in Linwood on Noblehurst Farms. Undesirable food enhanced with cow manure – run through a digester – morphs into very low cost electricity. Technologically speaking, the marriage that throws the big switch in innovation is called anaerobic digestion. At full capacity, a digester can produce enough electricity to power 400 households for a year.

Diverting food from landfills means less methane gas escaping into the atmosphere, and methane is a greenhouse gas 20 times more potent than carbon dioxide.

Chris Noble, the spark that threw the switch, says Noblehurst Farms diverts 500 tons of waste from landfills every month, eliminating 409 tons of carbon dioxide emissions, the equivalent of taking 1,046 cars off the road.

While many people will see a banana peel as waste or garbage, Chris sees pure green energy. Chris's seventh generation dairy farm has a total of 120 employees, 40 of whom work directly on the farm. The 31-member board of directors – family and others – was created in 1960. Commercial dairy farming in upstate New York has changed radically and quickly as many traditional small family farms have disappeared.

“If a business isn't growing, it's dying,” Chris says.

As the herd grew, he says the manure from a total of 2,000 dairy cows always presented a challenge. Now Chris says his operation sees manure as an asset. Farmers can haul waste, or for storage, create open, plastic lined lagoons unpopular with neighbors. The time honored treatment is spreading it – nitrogen rich and excellent for growing – on the land. Fields closest to the barn tend to be the richest. Modern times – with thousands of animals – means trucking cow manure and adds to the cost of doing business. Some farms run out of open land to spread on, especially in winter.

The light bulb moment for Chris, that got him going into the digester development, was a solution with tremendous benefits – including low cost power. Right now the energy powers the dairy and creamery, and the houses on the farm, and soon it will help make upstate, artisan cheddar cheese. The 30,000 square-foot, \$50 million cheese making plant, in partnership with Arla Foods and Dairy Farmers of America and powered by passive solar and digester produced electricity, is slated to open in early 2018.

But first the food waste has to get to the farm, so Chris pioneered Natural Upcycling – basically a fancy trucking company. As for upcycling, Chris predicts, “This business will change drastically in the next twenty years. When you think of where recycling bottles and cans was 20 years ago, that's where we are today. This is a nascent industry.”

He says finding drivers, “who like to feel like they are making a difference,” was one of the easiest parts of the puzzle to solve. Research by RIT indicates that it is economically feasible to haul waste only within a 100 mile radius from the digester.

“We are collecting as an extension of what we do with the digester. We collect from western New York all the way down into Tompkins County. In Tompkins County, we just purchased the hauling part of a business called Cayuga Compost. Our western New York operation is centered to work with all of the Wegman's stores in those areas. We are collecting in Buffalo, Rochester, all the way to Syracuse and along the Syracuse corridor. On the east side of Cayuga Lake we collect from Wells College. Closer to home, we have a pilot project to collect from York Central schools,” he says. Natural Upcycling just began harvesting food waste from the Ontario County jail in Hopewell, previously headed for the landfill in Seneca County.

Natural Upcycling's vehicles for hauling, that Chris calls “fancy dump trucks,” have a special feature of being somewhat self-cleaning. “Our trucks have a built-in power washer. Ours are tote-based customers. Many of them are taking the totes back into the store so it's very important that they are food grade sanitary.”

**Here's How It Works**

Food waste is collected weekly. Every day at the Noblehurst digester, the incoming non-edibles are scooped up by a skid steer and deposited on a conveyor belt, the moving gate keeper to the digesting process. The 440-kilowatt facility includes a concrete tank, 100 feet in diameter and 30 feet deep, sunk 10 feet below grade. The total cost is \$3.2 million, including a \$497,520 grant. The digester kind of looks like a bright red, circus-sized tent. The scope from waste to power takes about 28 days.

In a Wegmans press release, anaerobic digestion is described as a biological process that occurs when bacteria decomposes organic matter in the absence of oxygen. As the bacteria work, bio gas (mostly methane) is released. Bio gas is piped underground for cooling. It is then pressurized, metered, and fed into a heat and power unit that yields heat. The remaining waste, rich in nutrients and low in odor, becomes fertilizer, and can be used as bedding for the bovines. The energy produced replaces our dependence on traditional fossil fuels and eliminates greenhouse gas emissions.

Chainwide food donations from Wegmans totaled 14.5 million pounds of food to people in need in 2014. Food donations have always been part of their practice, but some food is uneatable. Noblehurst processed 5.5 million pounds of food waste from upstate Wegmans' stores to produce clean, renewable energy in 2016 alone.

Wegmans, now in the family farm business itself, celebrated its 100th anniversary in 2016.

But first, that tsunami of garbage has to be taken out of its cocoon of heavy packaging – a river of plastic, cardboard, paper, foil, caps, bottles, and cans. Enter Integrated Employee Services (IES) where a room full of employees, bused to the farm for half-day shifts, separate packaging from food waste. The IES mission statement, summarized, is to help people with disabilities meet their work-related goals for more rewarding lives. Chris says they take their work seriously. The centerpiece is a hopper that extrudes mostly liquids pumped to the digester – for example, soda and energy drinks beyond their expiration date and crates of mega-size mustard dispensers. What is left of its original packaging becomes a tangle of brightly-hued plastic and metal crushed beyond recognition. That material is now destined for a recycling center. For added continuity, Noblehurst Farms put Mike Thorton, from IES, on the farm's payroll.

Chris and his wife, Jennifer, are parents of young girls. The soft spoken good listener, once toiled as an MBA-graduate financier in Manhattan, after growing up working on the farm. He tweaks that day's recipe of the food and manure stream at his desk in the computer room. He also jockeys the skid steer towards moving mountains of undesirables toward the conveyor belt – the link in the food chain, so to speak. It's not as if tons of undigested food head for the digester. Imagine miles of limp, cooked spaghetti, slimy cold cuts, wilted pineapple tops, mounds of peppermint-flavored syrup, damp coffee grounds, damaged fruits and vegetables, and tons of mushy pumpkins after Halloween. Easter plants still clinging to their peat pots in late April. Even gourmet cheeses beyond their expiration date are doomed.

If you want to become more conscious about how much crap we all produce every day, take a tour. To help educate youth, they began working with nearby schools. Chris says that by the time his oldest daughter has graduated, it will be second nature for students to separate food waste as it hits the tote. He observes that little kids get what it's all about; teenagers not so much.

Right now a banana peel may be worth nothing, but when you can upcycle it to a digester, suddenly you are on the way to being able to turn the lights on. Noblehurst has essentially staked out the entire circle of life with family members still devoting themselves to planting, growing, harvesting, and now reclaiming food and reusing animal manure to produce green energy.

In 2016 Governor Cuomo announced the launch of an anaerobic digester on Long Island.

Upstate and the Finger Lakes are already there.

**One Family's History with Roots**

Of the 120 employees at Noblehurst Farms, many are family members. They have a mission statement highlighting land stewardship and respect for one's neighbors. Noblehurst milks about 1,700 cows daily, as well as tilling and harvesting some 3,000 acres of prime soil that straddles fields in Livingston and Genesee Counties.

“At our core we are both entrepreneurs and farmers,” says Chris Noble, the person responsible for the digester business. “We also provide good-paying jobs to other people.” Current employees include people with working papers from agricultural regions in Bhutan and others from Mexico. The Bhutanese were brought to the Rochester area by a church group and trained for the upstate dairy industry at a community college.

In addition to operating two dairy farms, the Noblehurst Farms brand sells commercial-grade landscaping equipment, offers feed commodities, and more. At various times they ran a commercial egg production business, potato storage, and raised pork for market. “Today,” Chris says, “we are diversifying on a much larger scale. It's all about proving technology and investing in it. We have to be good at everything we do to survive.”

Noblehurst Farms history, written by L. Joyce Noble in 2001, chronicles the seven-generation story of the Noble and the Klapper families as they progress from horse-drawn homesteaders to a much larger, modern dairy farm. Excerpts are from the diaries of her ancestors, who worked diligently in the early days of the Genesee Valley, beginning around 1805. Their productivity is exhausting to read about: they thrashed buckwheat and beans, bought and sold animals, canned vegetables, chopped wood, plowed and planted, picked potato bugs, hunted raccoons and squirrels, tended to fencing, fixed buggies, shod the horses, barreled apples, attended temperance meetings, and faithfully went to church. Marriages, births, and deaths are brief and to the point.

While many of the chores have changed, the purposeful energy that fuels the family-run farm is still forward thinking as it adapts to a cleaner, greener future.