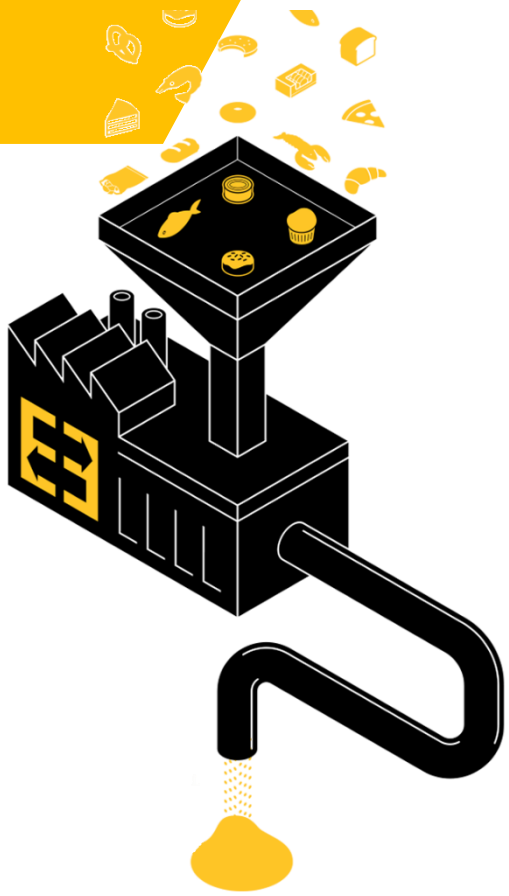
FEEDBACK

TURNKEY BYPRODUCT DRYING LINE OFFERING

January 2025



Contact

Alison Greenlee
greenlee@feedback.earth
857-225-6214

FEEDBACK

Contents

1 Turnkey Drying Plant Overview

FeedBack Earth is selling its best in class fully automated dryer production line. The production line includes the full complement of equipment essential for efficient operation including mixing, loading, drying, product screening, and all associated safety and monitoring systems. While the full line is available for purchase outright, Feedback has a strong interest in partnering with strategic parties to unlock economic value and deliver exceptional performance.

Feedback Earth spent three years developing a high-volume dryer operation. Although we originally purchased off-shelf "state-of-the-art" equipment, the as-built line had low energy efficiency, was prone to costly maintenance, and required constant operator attention to meet product specifications. Over the last three years, we invested over $3M to heavily modify the equipment design, install over 80+ sensors, and develop a custom programmable logic controller ("PLC") that automates operations based on real-time conditions. These proven upgrades allow our Demo Plant to efficiently and safely process and change-over to multiple products, including a wide range of food waste, crustacean shell, agricultural waste, manures, spent coffee grinds, and more.

Large byproduct generators (>1,000 tons per month) can partner with FeedBack as joint owners of a new waste drying facility or directly procure the turnkey drying plant along with FeedBack's end-to-end startup services. Given FeedBack's expertise in advanced drying systems, FeedBack can build, optimize, and operate a new operation while allowing byproduct supplier partners to share in the upside. For generators preferring to "go it alone" and build-out their own drying production lines, our turnkey solution provides a significantly lower-risk build-out that will save time and avoids expensive learning cycles, allowing you to focus on your core business.

Critical demonstrated features and capabilities of our operation include:

- ***Address a Wide Universe of Applications***
  - High throughput across multiple products
    - 32,000 lbs per hour for low-moisture feedstocks (25%- 35%)
    - 16,000 lbs per hour for high-moisture feedstocks (45%- 60%)
  - Pasteurized material via a monitored and certified "kill step" provides flexibility to accept and process high value waste.
  - Cooled finished product for bagging & handling
  - Double-stage mixer for homogenizing raw feedstock
  - Swappable screens on sizing / screening equipment for tailorable finished material size or grade

- ***Proven System to Run Profitably, Safely, and within Regulatory Standards***
  - >95% reliability in last 3 months of operation
  - Low-temperature (350 °F) high-efficiency fluidized bed dryer
  - Approx 4 ton/hour moisture removal when loaded correctly
  - Custom NFPA-compliant equipment sprinkler system that provides full-coverage of all high temperature areas along with a rapid-water draining system for a fast reset
  - 2024 stack testing data shows exhaust meets EPA Emissions Standards
  - Plant is permitted and meets regulatory expectations of Massachusetts DEP

- ***Operate With the Touch of a Button***
  - PLC and human-machine interface ("HMI") are remotely configurable, programmable, AND operable. You can control any part of the plant using personal cell phones or tablets
  - Technical team can remotely access, de-bug and address challenges in real-time
  - Automatic datalogger records monitored variables at 10-second intervals
  - In-line moisture sensors and temperature sensors have control-loops and trigger to adjust settings or safely stop and de-escalate concerning data
  - Zero-speed, no-load, and level sensors detect mechanical issues and clogs

- ***High ROI potential across multiple feedstocks with a Strong Partner***
  - Demonstrated all-in drying COGS of $50 - $130 / ton
  - Plant gross profit potential of $6M - $12M at full capacity (with unlimited feedstock)
  - All-in project and startup costs of $3M - $8M
  - A minimum of 500 – 1,500 tons per month needed for a $2M annual gross profit

- ***Sustainable Solution integral to the Green Economy***
  - Sustainability and economics are aligned with elevating byproducts
  - Organic byproduct decay is the largest single-source of global GHG emissions
  - Claiming the emissions of upcycled byproducts is often the largest lever facilities to meet their Tier 1-3 reduction targets
  - Beyond LCA analysis, FeedBack would organize carbon credit certification for the new drying operation

2 About FeedBack

Feedback Earth is a team of manufacturing and refinery engineers operating out of Grafton, MA to develop turnkey waste-to-value drying solutions. Our founding mission and now-affirmed belief is that tremendous volumes of organic byproducts are "wasted" because there are few systems that can reliably and cost-effectively harvest the value.

Our solution was to develop a turnkey operation and necessary know-how to flexibly and reliably process many types of feedstocks with minimal oversight. Over the last three years, we

built a high-volume production line that was iteratively upgraded with mechanical, process, instrumentation, and software enhancements . These improvements to the off-shelf equipment resulted in 2X the throughput, 70% higher energy efficiency, and – most importantly – 95% reliability, by automating the line to detect conditions and self-adjust settings to maintain optimized performance over a wide range of scenarios. FeedBack demonstrated the performance of this line across a wide range of organic byproducts (bakery, chicken manure, crustacean shell, spent coffee grinds, etc) at high volumes (2,000 – 3,000 tons per month). We are ready to replicate and continuously improve these capabilities on a national scale.

3 Managing Waste-to-Value

We will provide an original, modern plant and seek to partner with large generators to share in the best-in-class economics of the facility. You can profit from already de-risked economics for your byproducts and trust that the build and operational execution is being performed by a tried and tested group. Beyond the initial build, FeedBack will be pursuing value-adds for operations – such as establishing carbon credit programs. For generators considering to "go it alone" and build-out their own drying production lines, our turnkey solution provides a significantly lower-risk build-out that will save time and expensive-learning-cycles, allowing you to focus on your core business. Skillsets and our role on collaborative ventures include:

- Regulatory: Permitting can drive the largest uncertainty on project costs and timelines. We permitted the Demo Plant in Massachusetts where a lot was learned on how to thread-a-needle on reasonably meeting requirements. To save time, money, and build confidence with your existing regulatory body, we can adapt our existing permitting language to your project and minimize surprises with a solicited local regulatory expert. After approval, we can further implement the corresponding compliance programs.
- Marketing & Sales Channel Development: A realistic understanding of your finished product market can be a challenging "chicken-and-egg" problem that we have had to navigate many times. We can lead the original marketing and sales channel development to ensure full plant offtake through production ramping and set reasonable financial expectations through the first year. This can involve prospecting for offtake customers, generating original spec sheets, developing backlogs, and implementing strategies for product adoption.
- Financial Modeling: We have realistic financial models that can be adapted to budget and forecast a project from beginning to end and generate actionable reports for operations. Whether it's for developing the original financials needed for project financing or having day-to-day models and calculators, our financial tools can be adapted to save you time, provide confidence, and boost profitability.
- Financing Vehicle Development: Aggregating the original funding from a combination of public sources, banks, different lenders, incentive programs, or customer stakeholders

will determine this project's financial success. Our team has extensive experience in "stitching-together" financial options that is tailored to the project circumstances.

- Original Plant Design & Layout: Our Demo Plant is great, but your specific application or facility may be best-served by a modified layout or equipment substitution. We have 3D CAD of the Demo Plant and can add-to and modify layout to inform decisions, generate the plans to build, and create detailed designs. We further have gone through layout iterations many times and lived through the decisions; thus, we can guide partners through the considerations and trade-offs for the best outcomes.
- Procurement & Project Management through Commissioning: After building the Demo Plant once and then again with the learnings from the first iteration, we are well-versed in how to bid-out, procure, and oversee a build with reliable and cost-effective partners. Our team can iterate project concepts, manage developments, and cost- and time-efficiently address issues as they arise.
- Commissioning to Steady-State Operations: The costliest, most schedule-and-morale-crushing, and critical safety mistakes happen in the first 10 weeks following the first "burner lighting". A full and experienced team to comprehensively commission and optimize process settings while also developing and training the operations staff with reasonable-and-comprehensive digital checklists and SOPs. We further will solicit and train local specialists (electricians, etc) so that they are engaged and ready to support challenges as they arise. Establishing safe plant operations and culture is critical in your first months of operation, and our team will dramatically reduce the cost-intensive "learning cycles" for a successful project.
- Steady-State Operations Management: We can staff, manage, and oversee steady-state operations and report to ownership. Our management team would regularly be on-site, ensuring local staff is well-trained and service is well-tracked, and providing KPI-driven reporting and recommendations to increase profitability and reduce liability for approval.

4 Process and Equipment Description

FeedBack's MA Demo Line is available to view at our MA location through January. This line is one of up to three production lines we will be installing this year at alternate locations (the current MA line is being rebuilt in a facility closer to target feedstock). We strongly encourage interested generators to visit this facility and "get a feel" for the scale and nature of this operation. As reference for considerations forward, the original price to source and install the equipment for this turn-key line was approximately $3.4M, and the "R&D costs" associated with the iterative upgrades and optimizations was over $3M. We built and commissioned this operation in 6 months and estimate 3-4 month timelines for new builds.

4.1 MA Demo plant layout

Below are 2D and 3D CAD images of the Demo Plant layout as it currently stands today. Note that we are sharing this layout with you for illustrative purposes only. Constraints such as pre-existing building size, adjacent operations, entrances and exits affect equipment layout.

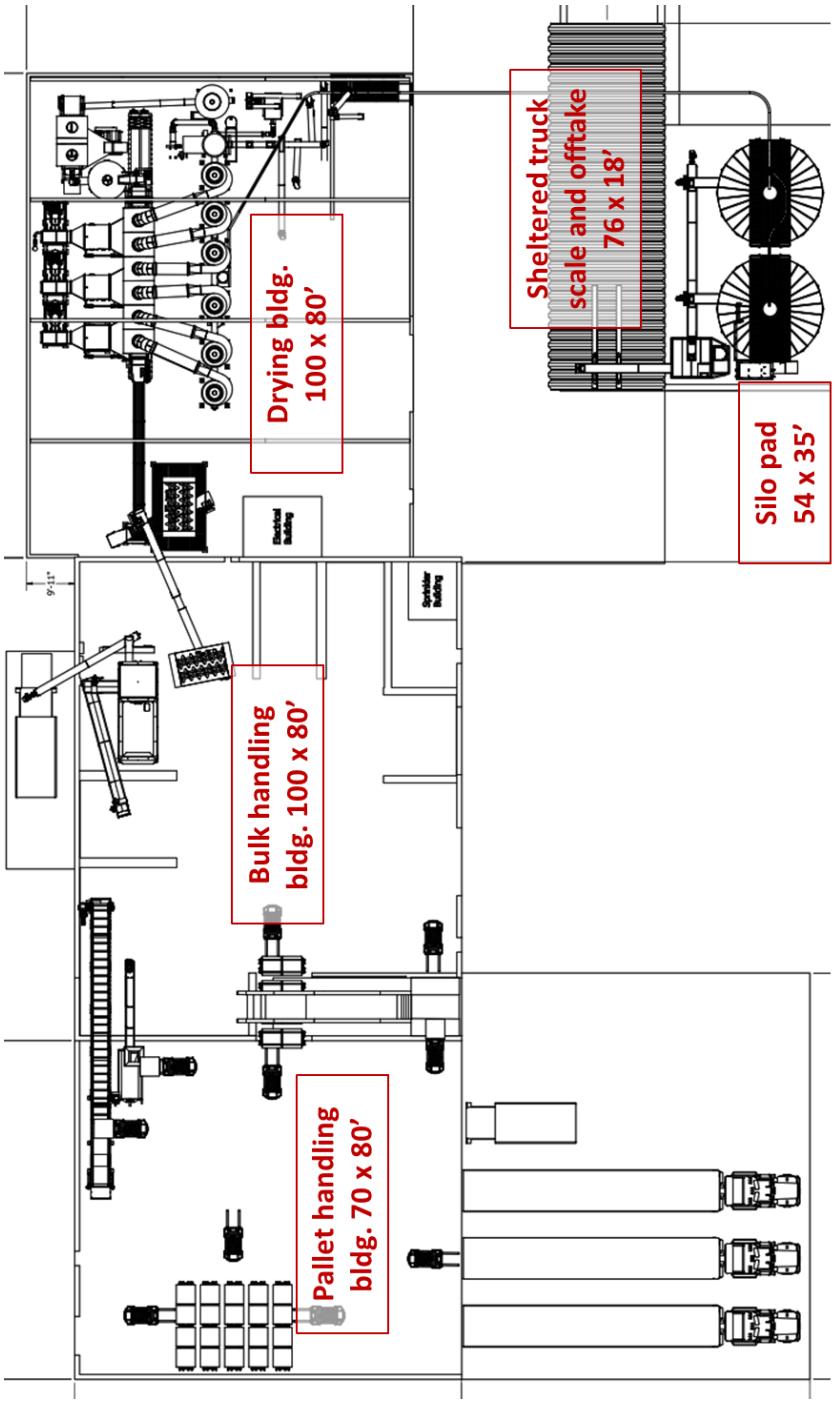


Figure 1: MA Demo Plant facility layout

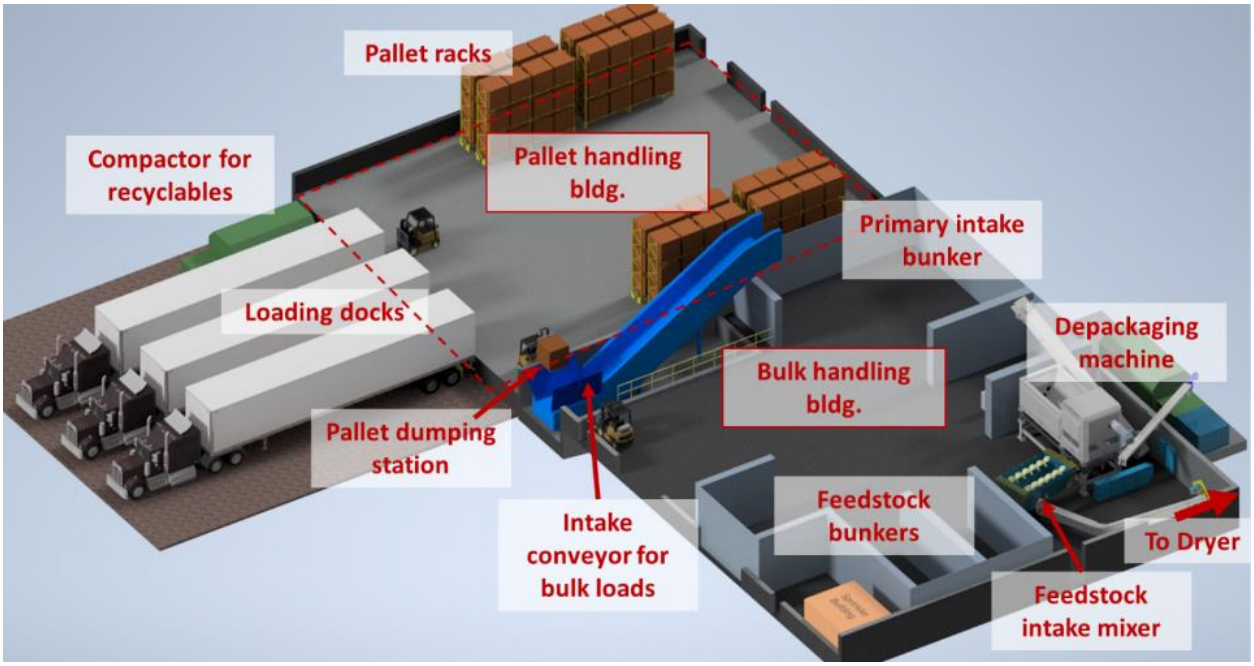


Figure 2: CAD image of pallet and bulk handling buildings

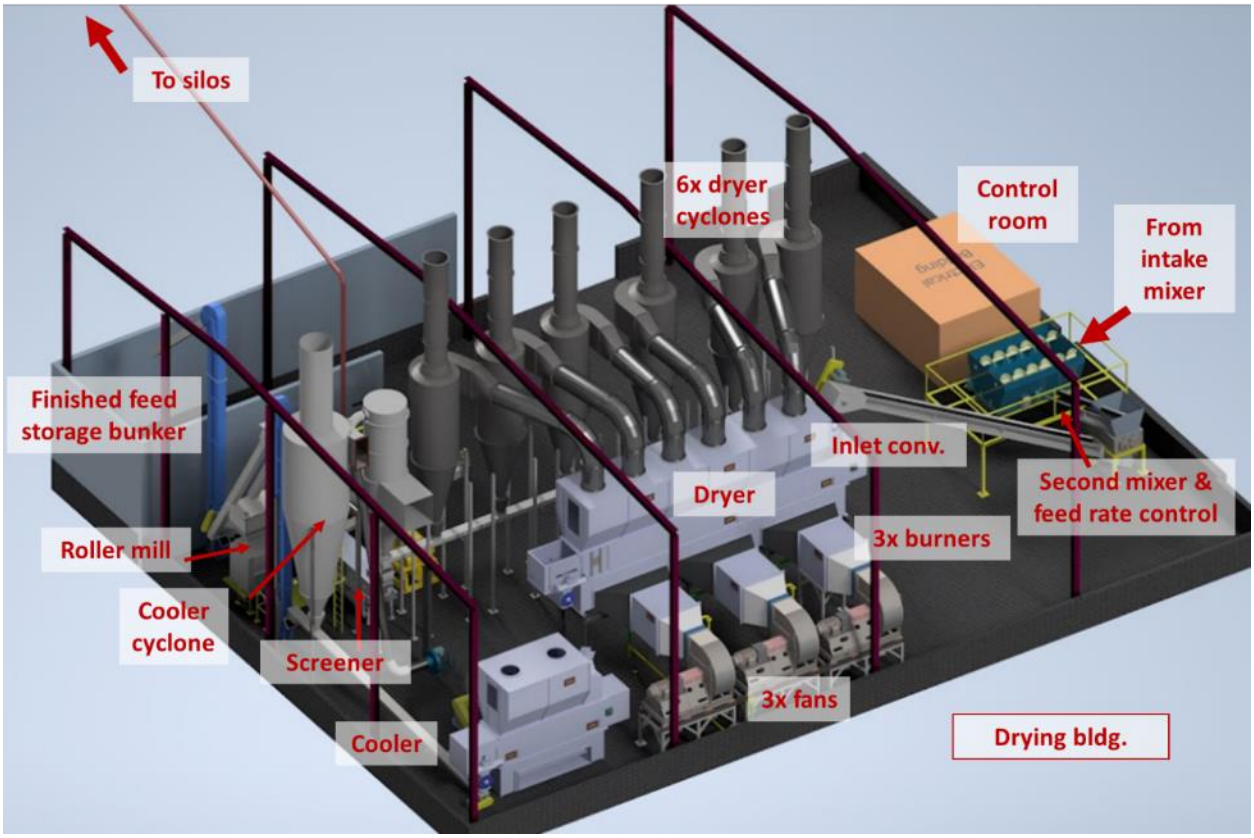


Figure 3: CAD image of drying building

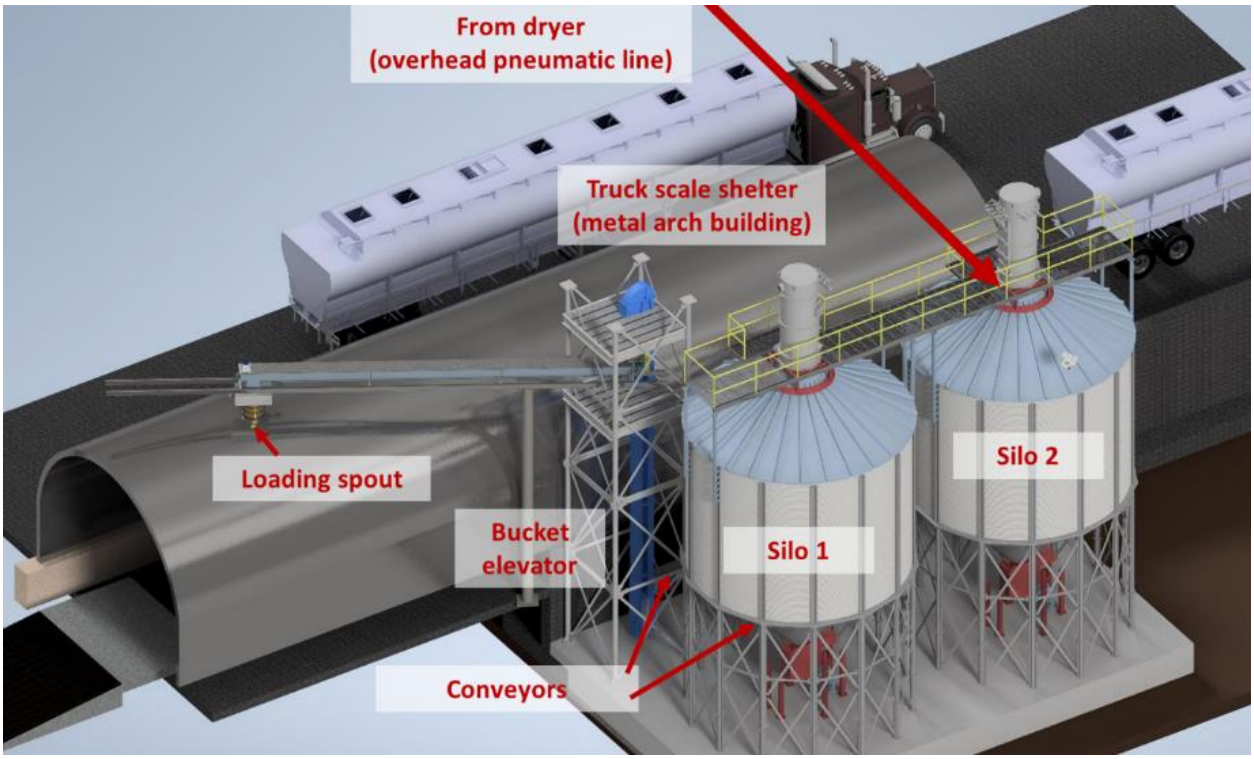


Figure 4: CAD image of silos and truck-loading station

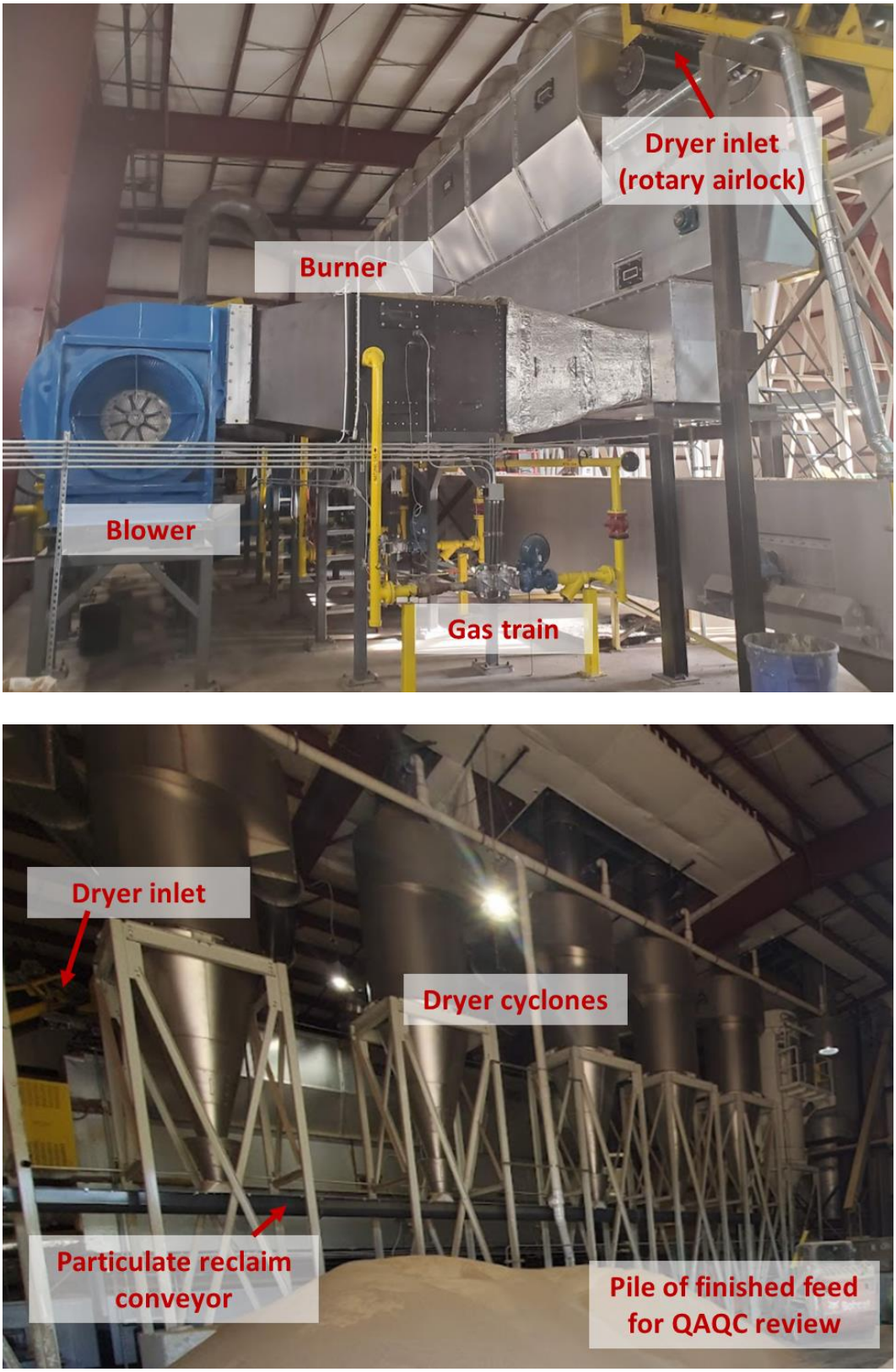


Figure 5: Photographs of as-installed equipment

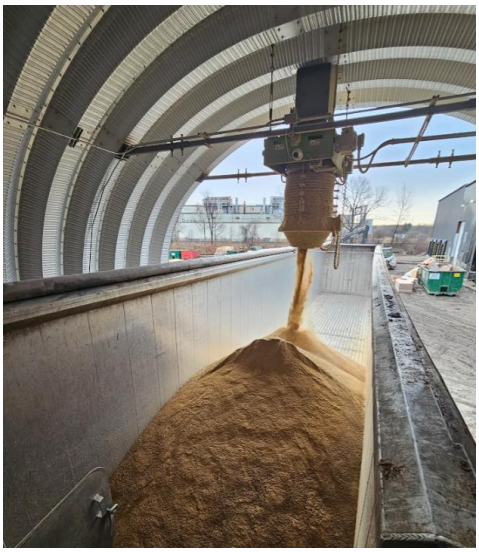


Figure 6: silo and truck-loading station

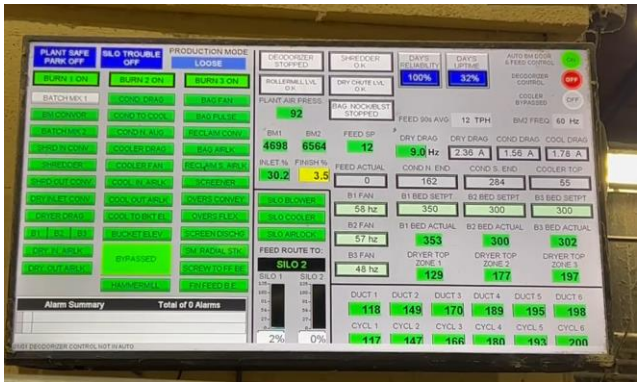


Figure 7: Plant control and status screens on various devices

4.2 Description of drying process stages

There are seven stages to the drying process:

1. Feedstock intake and pre-processing
2. Feed rate control
3. Drying
4. Pasteurization
5. Cooling
6. Product sizing and screening
7. Storage

1: Feedstock intake and pre-processing

- Homogenous finished product requires homogenous feedstock
- Inadequate mixing can result in variable specs and time-intensive system clogs
- Our system first receives raw feedstock into a 10,000 lb mixer that uses four counterrotating screws to compression-mix material per a PLC-driven recipe
- Mixed material is then conveyed to a second 10,000 lb mixer for a second pass
- Both mixers are instrumented with load-cells (1lb resolution) to provide real-time weight. This enables precise recipes when combining different feedstocks.

2: Feed rate control

- Achieving high throughput and energy efficiency requires a steady feed rate
- Fluctuating rates result in “slugs” of over- or under-cooked finished product
- Feed rate to the dryer is determined by the height of the second mixer’s outlet door (more-open door = higher rates, more-closed door = lower rates)
- All feedstocks vary in density, moisture, and other variables that affect how they flow. Most of that variability is eliminated by homogenization within the two mixers, which provide a 20,000 lb mixing buffer before introducing material into the dryer.
- Even after mixing, small adjustments must be made to the door opening to compensate for real-time fluctuations in flow. This function is implemented with fully automatic closed-loop control. Our system monitors the mixer loading in real-time and automatically adjusts the door height to maintain a smooth, reliable feed rate into the dryer without operator intervention.
- Feedstock is sized by a shredder, hammermill, or pelletizer before the dryer to break up material that may have fallen out of the mixer in big chunks

3: Drying

- Efficiency was one of the most important factors in our selection of drying technologies. The dryer’s energy efficiency affects both the cost of energy and its throughput.
- Our system utilizes a fluidized bed dryer (FBD). Ambient air is heated up and forcibly pushed through a continuously-moving bed of feedstock. Individual pellets

or nuggets bounce around as the hot air percolates through the bed. Moisture evaporates as the material is dragged through the dryer. Particulates entrained in the air exhaust are separated out by high-efficiency cyclones and recaptured.
- FBDs are known to offer higher energy efficiency than drum dryers, which are more commonplace for food waste drying. However, significant instrumentation and automation is needed to achieve those higher efficiencies and avoid breakdowns (e.g. overfeeding the dryer can result in clogs that must be cleared manually).

4: Pasteurization

- A pasteurization "kill-step" is required when processing animal proteins, manures, and suspect feedstocks. FDA regulations specify 212 °F and 30 mins as the minimum treatment.
- The cores of individual feedstock pellets that exit the dryer may not have reached a high enough temperature to guarantee pasteurization.
- Our system includes a heated, enclosed conveyor to treat material after it exits the dryer and guarantee pasteurization standards. Dwell time and temperature are configurable parameters; typical values are 250 °F and 45 mins.

5: Cooling

- Certain feedstocks remain sticky when hot, even when meeting target moisture specs, and can agglomerate or bridge in bulk as a result.
- Additionally, uncooled material exiting dryers is a known fire hazard for bagging stations and can also cause burn injuries.
- Our system incorporates a forced-air cooling unit. Finished product is typically around 75 °F

6: Product sizing and screening

- Different customers have different specifications for the size of the final product. Sizing and screening takes place after the material is cooled and dried.
- Our system combines a hammermill and rotary screener to flexibly produce material ranging from a fine meal to a coarse product up to ¾". Swapping out screens in either machine is a simple procedure that requires a few minutes.
- In addition to providing flexibility on product size and consistency, this equipment enables simultaneous dual output streams. This ability can be used, for example, to separate residual trash from the dried product or continuously produce two differently-sized materials.

7: Storage

- Finished product is typically stored in bags or in silos for eventual bulk offtake
- Our system flexibly channels feed to either a supersack filling station or pneumatically to one of two 150-ton silos located up to 120 ft away
- It is instrumented to monitor the level in each silo continuously. The PLC autonomously switches silos when the active one is full and reverts the stream to a

backup floor bunker if the silo system is somehow unusable, all without interrupting production.
- The silo discharge system can autonomously load a trailer to 30 tons in 25 minutes.
- The silo discharges feed from each silo at a configurable rate and ratio, so if the final product is a mixture of two different stored materials, they can be flexibly combined right as a truck is being loaded.

4.3 Integrated fire protection system

Fire safety for drying requires a multi-facetted and comprehensive approach for personnel training, situational procedures, and equipment systems. Our fire safety approach has been meticulously and iteratively developed, from prevention to containment to system reset. Specifics to the approach include

1. **Prevention:** FeedBack developed and utilizes written procedures, preventative maintenance protocols, safety checklists for different feedstocks, and personnel training modules as the most basic element of plant safety.
2. **Detection:** The dryer is highly instrumented to detect hazardous conditions that could eventually lead to a fire. If questionable conditions are detected, the PLC autonomously "parks" the plant in a safe state notifies personnel to review the suspected conditions. If more severe conditions are detected, the PLC de-energizes the line and auto-initiates the early-response sprinkler system in the high temperature areas.
3. **Suppression:** Our dryer line has a comprehensive secondary fusible sprinkler system that self-activate if high temperatures are detected. This system covers the full dryer system, cyclones, and exhaust stacks and was designed by Jensen Hughes.
4. **Reset:** A fast system reset after sprinkler water has been sprayed is critical to ensure precautionary actions are low-consequence and the team feels confident that safety is the top priority. Our system has drains and quick clean-out features that enable a system to be reset within hours of sprinkler water deployment and back to capable of production within 1 shift of the event.

4.4 Control Interface and Status Screens

The PLC and HMI are remotely configurable, programmable, AND operable. You can control any conveyor from your cell phone while connected to the internet. Approximately 100 process parameters are observed in real time. The PLC is programmed to self-initiate corrective protocols when it detects sub-optimal or safety-concerning conditions (e.g. lower-than-normal throughput, abnormally high temperature, stalled conveyors, clogged chutes). Reducing the facility's dependence on time-sensitive and unreliable human decision-making results in safer, less-variable, and less-costly operations.Complete schematics, startup / operating / restart / shut-down procedures, ladder logic diagram, cause-and-effect matrix, and other technical documents can be made available upon request to serious parties.

5 Illustrative Economics

A profitable high-volume drying operation requires enough profitable feedstock to "make it work" and the budget to get started. We have extensive experience in the industry and are prepared to assist potential partners in preparing and evaluating a business plan based on their specific needs. We have provided a sample set of data on the performance and economics of our MA Demo Plant for some of our demonstrated feedstocks. This data includes the profitability of feedstocks and the material volumes needed to generate $2M of gross profit; max annual gross profit for a system operating at full capacity (assuming unlimited feedstock); and the detailed cost and throughput data. Finally, the tables below provide a breakdown of the all-in capital requirements for a drying operation. If you find these "ballpark" numbers compelling, we can adapt our comprehensive Excel models to your specific feedstocks and situation to frame some "bottom-line" project expectations.

The goal of these tables is to provide a starting point and framework to ground engagement and discussion forward. Factors that can ultimately drive a project's ROI that are not discussed here include logistic costs, insurance, management staff, etc. as these costs are very project-specific. Some general guidance and expectations from tables are

- The all-in cost of an installed turn-key production line is $3M-$8M
- The additional plant startup cost can be $0.5M - $1M
- Generating $2M per year of annual gross profit requires a minimum of 500 – 1,500 tons per month of available raw feedstock
- Maximum plant capacity of raw feedstock is roughly 3,500 – 6,500 tons per month, with higher capacity for lower moisture feedstocks
- At maximum capacity (assuming unlimited feedstock), this turn-key plant can generate a nominal $6M - $12M annual gross profit across multiple products

Product Profitability Overview: Monthly Volumes to achieve $2M annual profit

	$ / dry finished ton				Monthly feedstock (tons) required for $2M/yr profit
	Sale price	COGS	Profit	Margin	
Dried bakery	$190	$67	$123	65%	1,355
Crustacean shell	$850	$115	$735	86%	227
Chicken manure	$350	$80	$270	77%	618
Spent coffee	$400	$124	$276	69%	603

Maximum Demo Plant Earnings Potential: Earnings by Product

	Profit $/ton	Max feedstock capacity (tons/mo)	Max finished product capacity (tons/mo)	Operating mo/yr	Max gross profit
Dried bakery	$123	6,677	5,130	12	$7,571,781
Crustacean shell	$735	3,895	2,110	6	$9,307,211
Chicken manure	$270	5,564	3,836	12	$12,411,807
Spent coffee	$276	3,617	1,781	12	$5,906,000

Demo Plant Illustrative COGS: Costs and Throughput by Product

	Bakery	Lobster	Chicken Manure	Spent Coffee
PRODUCTION THROUGHPUT				
Moisture	32%	55%	40%	60%
Nominal Feedstock Tons per Hr	12	7	10	6.5
Reliability	92%	92%	92%	92%
Feedstock Tons per HR	11.0	6.4	9.2	6.0
Hours per Day	24	24	24	24
Days per Week	6	6	6	6
Feedstock Tons per MO	6,677	3,895	5,564	3,617
Shrinkage Loss	1.50%	1.50%	1.50%	1.50%
Finished Dry Tons per MO	**5,130**	**2,110**	**3,836**	**1,781**
MASSACHUSETTS COST INPUTS				
$ / MMBTU Nat Gas	$ 12	$ 12	$ 12	$ 12
$ / kWh	$ 0.25	$ 0.25	$ 0.25	$ 0.25
$ / hr operator	$ 40	$ 40	$ 40	$ 40
#Operators	2	2	2	2
DRYING COGS - $ / FINISHED DRY TON IN MASSACHUSETTS				
Gas	$ 22	$ 38	$ 26	$ 41
Electricity	$ 12	$ 21	$ 14	$ 22
Labor	$ 18	$ 31	$ 22	$ 33
Maintenance	$ 12	$ 21	$ 14	$ 22
Other	$ 3	$ 5	$ 4	$ 6
COGS - $ / Finished Dry Ton	$ 67	$ 115	$ 80	$ 124

Site and Plant Installation Estimated Cost

Description	Expectation	Financing expectation % lease-able	Financeable amt	Not leaseable amt
Drying line				
Dryer system, installed + commissioned	$ 3,619,160	75%	$ 2,714,370	$ 904,790
Depackaging System	$ 350,000	50%	$ 175,000	$ 175,000
Drying line subtotal	**$ 3,969,160**	**0%**	**$ 2,889,370**	**$ 1,079,790**
Feedstock intake, finished product storage				
Feedstock acceptance / handling	$ -	90%	$ -	$ -
Silo system, installed + commissioned	$ 893,700	40%	$ 357,480	$ 536,220
Intake + storage subtotal	**$ 1,043,700**	**34%**	**$ 357,480**	**$ 536,220**
Facility				
Property	$ 400,000	100%	$ 400,000	$ -
Building	$ 2,219,000	75%	$ 1,664,250	$ 554,750
Facility subtotal	**$ 2,219,000**	**93%**	**$ 2,064,250**	**$ 554,750**
Startup / Commissioning				
FeedBack Project Management	$ 256,000	0%	$ -	$ 256,000
Marketing	$ 120,000	0%	$ -	$ 120,000
Startup Miscellenea	$ 150,000	0%	$ -	$ 150,000
Startup / Commissioning subtotal	**$ 526,000**	**0%**	**$ -**	**$ 526,000**
All-in Project Cost	**$ 7,757,860**	**68%**	**$ 5,311,100**	**$ 2,696,760**

6 Warehousing and Utility Recommendations

The dryer and auxiliary equipment must be installed and operated indoors and requires an adequate supply of electricity, natural gas, and water. Climate control is not needed but would improve worker conditions. The silos must be installed on a separate, engineered foundation.

Warehouse recommendations

- Zoning: Light industrial or equivalent
- Clear space dimensions: 150 x 60’ minimum, 150 x 100’ recommended
- Clear height: 22’ minimum, 30’ recommended
- Fire protection: Ordinary Hazard Group 1 sprinkler coverage
- Slab: standard-strength industrial warehouse (6” thick, #4 rebar 12-18” on center)
- Equipment footprint
    i. Compressed / tight: 100’ x 50’
    ii. Fit-for-purpose: 120’ x 60’
    iii. Relaxed: 150’ x 80’
- Hazard rating / building sprinklers: Ordinary Hazard Group 1

Utilities:

- Electrical: 1,500 A, 480 V, 3-phase service or equivalent
- MA Demo Plant uses natural gas. Conversion to propane requires minor equipment additions. Gas train size: 3” line at 5 psi. Peak demand: 30 MBTU/h
- Water: 1.25” domestic water line at 60 psi static pressure
- Firewater: 3” line, 60 psi static pressure to supply the “large” suppression system. There are ~30 fusible heads (i.e. water only flows through sprinklers that tripped on high temp).

Silo foundation

- Standalone foundation dimensions: 55 x 30’
- Can abut the building foundation. Must be within 150’ of the dryer output.
- Engineering required (seismic / floodplain rated). Likely needs to be 2’ thick or more.