

The Digest's 2026 Multi-Slide Guide to Distributed Plastic-to-Fuel

Plastic conversion has failed on feedstock specification, not tons per day. Evidence favors local collection, regional sorting, and conversion integrated where its product is used.

Distributing Conversion Trades Cheap Transport for Expensive Replicated Conditioning

Where the bottleneck sits

- Local collection and MRFs provide access to waste, but mixed streams rarely meet a reactor's written feed specification without further sorting.
- Conversion near waste does not eliminate conditioning. Replicating sorting beside multiple reactors can multiply the expensive, scale-sensitive step.
- The critical siting question is where sorting can deliver compliant feed consistently—not how close a reactor is to discarded plastic.

What the evidence shows

- Baled transport is ~\$70/ton versus ~\$345/ton for sorting; collected-and-sorted system costs are ~\$689–889/ton. Transport is only about 8–10% of that total.
- Brightmark Ashley's ~300 t/d plant delivered about 5% of nameplate, while two roughly 15 t/d Plastic Energy plants have reportedly operated since 2016–17. Their utilization is undisclosed.
- These cases do not establish a size-based quality cutoff. They make feedstock conformance and demonstrated throughput more useful tests than rated capacity.

Architecture and underwriting

- Keep collection and MRF primary sorting local; aggregate secondary sorting regionally, where the cost model assumes a 50,000 t/yr facility.
- Site conversion with the product's user and contract for conditioned feed that meets a written specification, including contamination limits and rejection rights.
- Before replicating a unit, require lifetime tonnage against nameplate, material-loss data and product disposition. Large integrated plants' utilization is undisclosed, so their advantage remains a cost-structure inference.

Takeaway

Favor local collection → regional sorting → conversion integrated with the product's user. Underwrite who controls and verifies feedstock specification, not a proposed converter's tons per day.

The Decentralized Recycling Promise



The proposed local operating model

- Collect mixed plastic near its source and convert it locally, rather than hauling it to a large central reactor.
- The premise is that shorter journeys reduce logistics costs and make a nearby waste stream a dependable supply.
- Collection alone does not make reactor-ready feed: sorting must deliver material that meets a written conversion specification.
- Conforming feed enables stable operation near design rate; demonstrated output then supports product offtake and gate-fee revenue.
- The topology choice is whether to distribute reactors or keep local collection while aggregating sorting and conversion at larger hubs.

Local conversion promises lower transport costs, but its operating case depends on consistent, specification-controlled feed. The consequential siting decision is where sorting and conversion can reliably meet that specification.

The Number Everyone Quotes: 50 Tons Per Day

50 t/d is not a demonstrated quality cliff: a much larger plant underperformed, while smaller plants have reportedly continued supplying customers. Screen for feedstock specification and demonstrated throughput rather than nameplate capacity alone.

The threshold fails in both directions

- The common heuristic says converters below roughly 50 tons per day rarely make commercial-grade product. It is often used to screen out distributed plastic-to-fuel projects.
- Brightmark Ashley was far above the cutoff at roughly 300 t/d, yet demonstrated output reached only about 5% of nameplate over roughly four years.
- Plastic Energy's Almería and Seville units, at roughly 15 t/d each, have reportedly operated since 2016–17 and supplied petrochemical customers. Their utilization remains undisclosed.
- Published estimates place typical commercial pyrolysis capacity at 25–100 t/d. They describe small-scale viability in terms of gate fees, not a 50 t/d product-quality boundary.



Brightmark Ashley, Indiana: A 300 t/d Plant That Reached 5 Percent

Ashley was far above proposed minimum plant sizes yet delivered only ~5% of nameplate output. Its failure shows that capacity alone cannot establish reliable plastic conversion; demonstrated throughput and feedstock conformance matter more.



Brightmark Ashley

- Ashley, Indiana plastics-conversion facility operated by Brightmark.
- Nameplate capacity: 100,000 t/yr, approximately 300 t/d.
- Capacity exceeded proposed minimum-scale thresholds for commercial conversion.
- Performance and bankruptcy figures are drawn chiefly from court filings.

Observed performance

- Despite its ~300 t/d nameplate, demonstrated output was roughly 4 million lb over about four years, reported as ~5% of nameplate.
- At least six to seven fires were reported from 2020 onward, adding a significant operational and safety concern to weak output.
- The facility entered Chapter 11 in March 2025; its large design capacity did not translate into sustained commercial performance.

Outcome and implication

- The plant sold at auction for \$14.3M, about 5.5% of its approximately \$260M capital expenditure.
- Ashley's outcome rejects plant size alone as an explanation for poor conversion performance at commercial scale.
- Screen comparable projects using sustained output against nameplate, safety history and evidence of feedstock conformance.
- Ashley's 2026 operating status remains unconfirmed; Skive's ~35% rate over 7+ days is not a lifetime comparison.

Small Plants That Kept Running: Falsification From the Other Side

A roughly 300 t/d plant delivered about 5% of nameplate, while two roughly 15 t/d plants have reportedly continued supplying customers. These cases undermine 50 t/d as a reliable quality cutoff, but undisclosed utilization prevents treating the smaller plants as proven high performers.

Brightmark Ashley: large capacity, limited output

- Ashley's nameplate was 100,000 tonnes per year, approximately 300 tonnes per day—six times the commonly cited 50 t/d threshold.
- Demonstrated output was roughly 4 million pounds over about four years, approximately 5% of nameplate capacity.
- The project entered Chapter 11 in March 2025; its 2026 operating status is unconfirmed.
- Ashley shows that capacity well above 50 t/d does not guarantee sustained production.

Plastic Energy: smaller plants with reported longevity

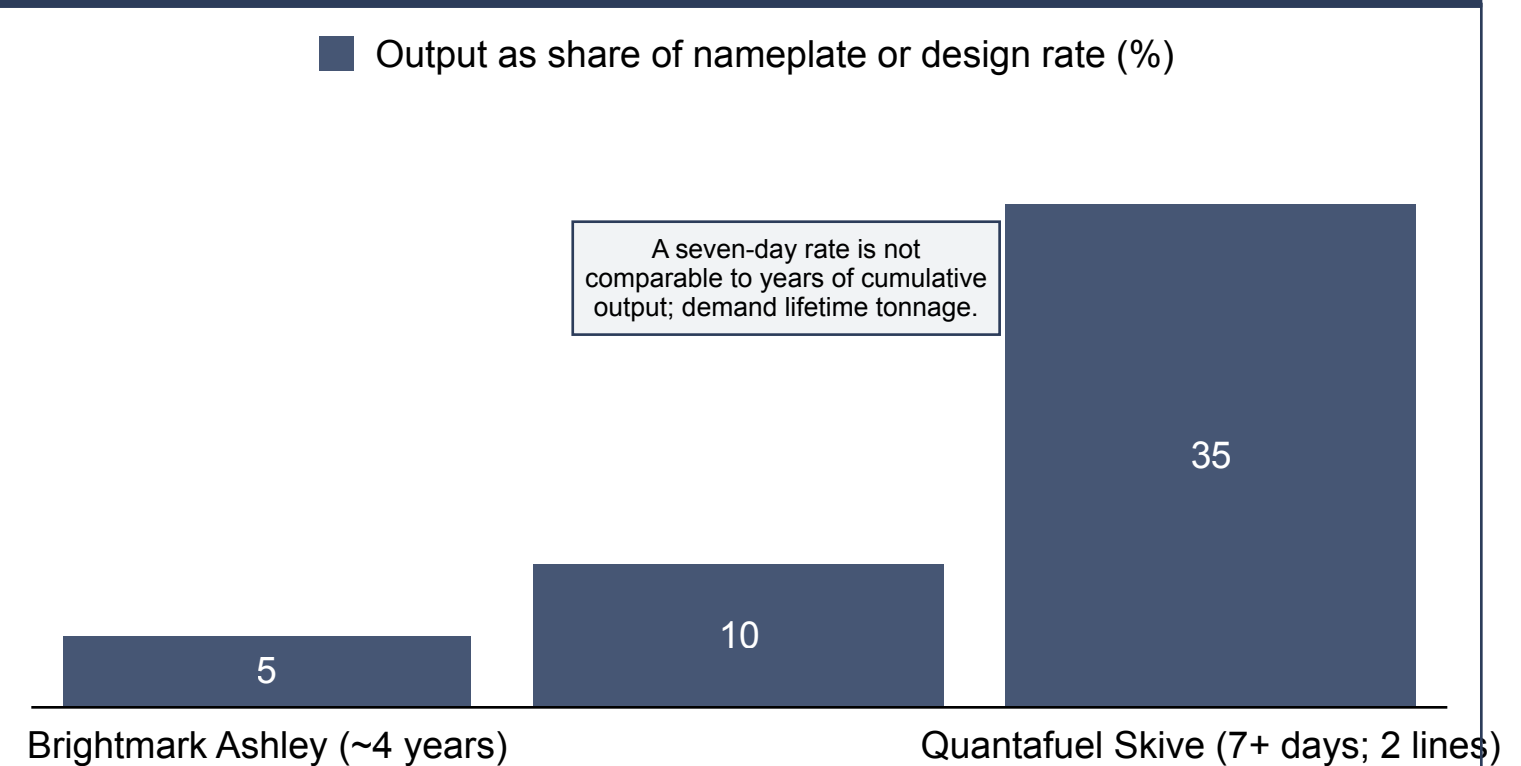
- The Almería and Seville plants each have roughly 15 t/d of capacity, well below the proposed threshold.
- They have reportedly operated since 2016–2017 and supplied petrochemical customers.
- Their operating history challenges the claim that sub-50 t/d plants cannot supply customers.
- Utilization and lifetime tonnage are undisclosed; years in operation do not establish high throughput or consistent product quality.

Nameplate Versus Lifetime Tonnage: The Honest Measure

Read the denominator and duration

- Brightmark Ashley: ~5% of nameplate over roughly four years despite a 100,000 t/yr (~300 t/d) rating.
- Agilyx/AmSty Regenyx: ~4,400 tonnes over 2012–2024, or ~10% lifetime utilization against its 10 t/d nameplate.
- Quantafuel Skive: ~35% of design rate on two lines for 7+ days; this is a short-run rate, not lifetime utilization.
- Compare cumulative output with capacity over the same operating period; report the measurement window alongside every utilization figure.
- Require product disposition as well as tonnage: material counted as output need not have reached the intended customer.

Demonstrated output as a share of nameplate or design rate (%)



Ashley and Regenyx delivered roughly 5% and 10% of nameplate over multiyear periods. Skive's roughly 35% was measured over just seven-plus days on two lines, so its bar cannot establish lifetime performance.

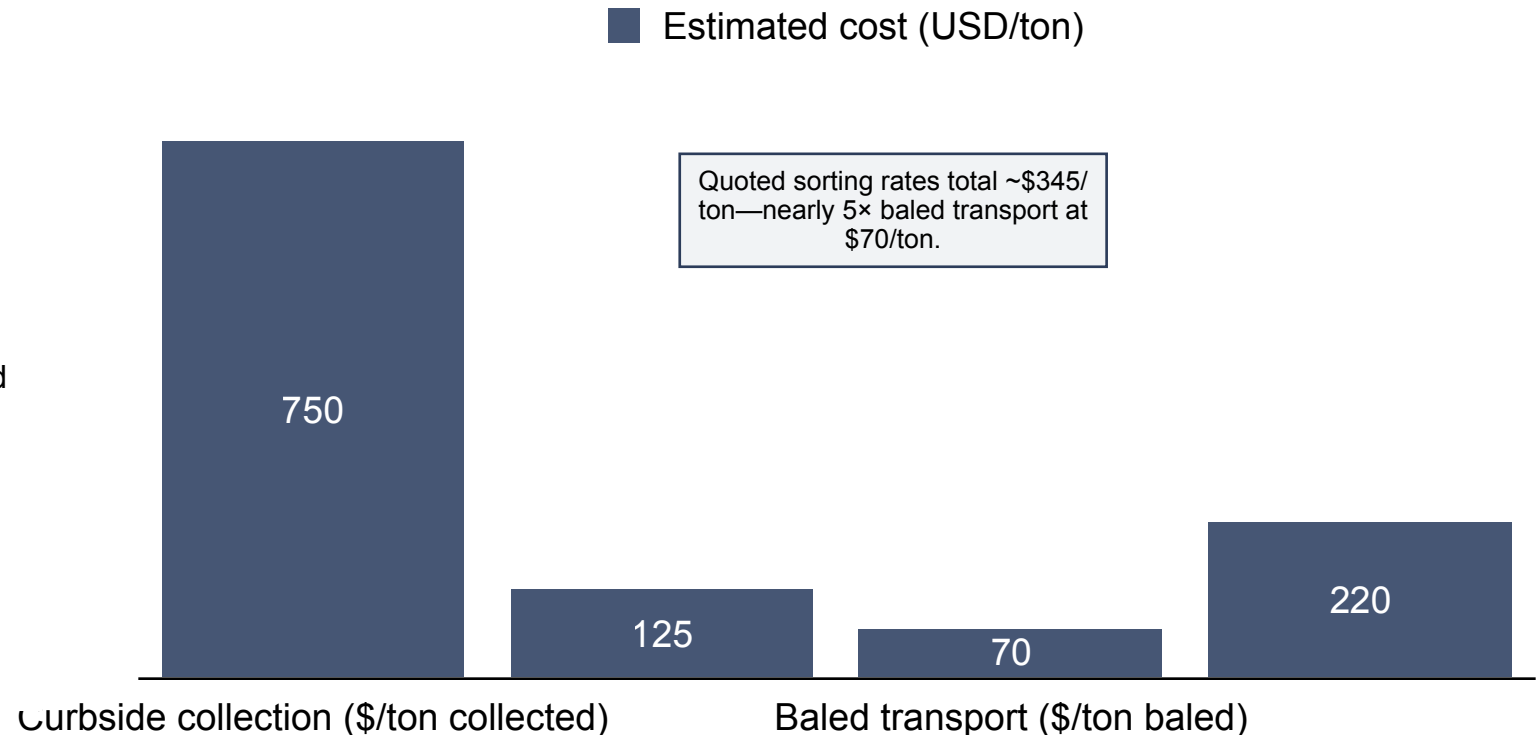
The Cost Ledger: Sorting Costs Five Times What Transport Does

Primary and secondary sorting rates total about \$345 per ton in the APR/Eunomia estimate, versus \$70 per ton for baled transport. Avoiding freight offers little relief if conversion requires replicated feedstock conditioning.

Cost and topology implications

- Primary sorting costs \$125/ton input and secondary sorting \$220/ton output; their quoted rates sum to ~\$345, versus \$70 for baled transport.
- Modeled system cost is ~\$689/ton collected or ~\$889/ton sorted; \$70 freight is roughly 8–10% of either total.
- The MRF loses 35% of collected film, so collection tonnage overstates material available for further conditioning.
- Secondary sorting assumes 50,000 t/year; modeled per-ton costs rise at smaller facilities, weakening replicated local sorting.
- These commissioned estimates assume baled transport. Stage rates use different denominators and do not form an additive system total.

Estimated plastics supply-chain costs (\$/ton; stage-specific bases)



Why Proximity Saves So Little

Proximity to waste avoids the cheapest cost item while leaving feedstock conditioning unresolved. Favor local collection, regional sorting, and conversion integrated with the product's user.

The cost of moving versus conditioning

- Baled transport costs about \$70 per ton—only ~8–10% of the estimated \$689–889 per ton collected-and-sorted system cost. Eliminating that leg cannot transform the economics.
- Primary and secondary sorting cost roughly \$345 per ton combined, about five times transport. A converter near the waste still needs plastic conditioned to its written feed specification.
- Local collection and MRF primary sorting preserve contact with the waste stream. Regional secondary sorting aggregates enough material to control composition and spread its fixed costs.
- Conversion gains a stronger location advantage beside the product's user, where offtake is integrated—not beside unsorted waste. The smallest defensible distributed unit is the collection/MRF node, not the converter.



Renew Phoenix: Contamination at Ten Times Plan

Renew Phoenix reportedly received plastic contaminated at ten times the expected level and never started. Feedstock conformance—not converter size—was the decisive reported obstacle; plant operating records are not public.



Project context

- Renew Phoenix was a plastics conversion project tied to a municipal collection program.
- The linked program diverted roughly 2,000 tons over approximately eight years.
- Collected tonnage did not establish that material met the converter's feed requirements.
- Evidence comes from investigative reporting and collection-program tonnage.

Why the plant did not start

- Delivered plastic was reportedly contaminated at ten times the level the project had been told to expect.
- The conversion plant reportedly never got up and running despite the linked collection program's diverted tonnage.
- Municipal collection supplied material, but the reported contamination gap prevented reliable reactor-ready feed.
- The plant's own operating records are not public, limiting independent verification of the reported cause.

Specification lesson

- Set a written conversion-feed specification before contracting collection and sorting, with measurable contamination limits.
- Test and log incoming loads against that specification, and secure contractual rights to reject nonconforming material.
- Contract enough sorting capacity to deliver compliant feed before commissioning a converter or counting collection as supply.
- Treat Renew Phoenix as reported evidence of a feedstock mismatch, not proof of performance at any plant size.

Agilyx/AmSty Regenyx: What Small-Scale Failure Looks Like

A 10 t/d nameplate yielded about 4,400 tonnes over 2012–2024—roughly 10% lifetime utilization. Most output was burned in cement kilns rather than re-polymerized; lifetime tonnage and product disposition tell more than capacity.



Regenyx overview

- Oregon polystyrene depolymerization project operated by Agilyx and AmSty.
- Nameplate conversion capacity: 10 tonnes per day.
- Reported operating period: 2012–2024.
- Partners characterize the effort as a completed five-year demonstration.

Measured performance

- The 10 t/d nameplate translated to about 4,400 tonnes produced over 2012–2024, or roughly 10% utilization across the stated period.
- Reported material loss reached 89%, limiting how much incoming polystyrene emerged as useful output.
- Operating losses totaled \$22.4 million in 2020–21, showing that installed capacity alone did not establish economic performance.

Output disposition and lesson

- Most output went to cement kilns for combustion rather than being re-polymerized into new plastic.
- Assess the unit using lifetime tonnage against nameplate, alongside material loss and final product disposition.
- Keep the comparison bounded: polystyrene depolymerization is not mixed-plastic-to-fuel, though the utilization warning applies.

Where the Scale Line Really Sits: An Economic Band, Not a Quality Cliff

The 50 t/d heuristic is not a supported quality cliff. Published thresholds describe an economic band and the importance of gate-fee revenue—not proof that plants above a given size make commercial-grade product.

Small units have a defined niche

- A 2024 academic review calls pyrolysis “the only viable solution for treating up to 12 TPD” of plastic waste.
- That finding places very small units within a potential treatment niche; it does not establish that their output meets a particular product specification.
- Reactor throughput alone cannot establish feedstock conformance, sustained utilization, or saleable output.
- A small unit still needs conditioned feed and a buyer for its product; nameplate capacity proves neither.

Commercial scale depends on revenue

- The same literature places typical commercial pyrolysis capacity at 25–100 tonnes per day.
- Fifty tonnes per day lies inside that range, not at a demonstrated product-quality boundary.
- The review finds small-scale operation economically unviable without a gate fee of roughly €50–86 per tonne.
- A gate fee is a structural revenue term: whether it is available can change project viability without changing reactor size or product quality.

Sorting Has Its Own Scale Floor



The constraint sits upstream of the reactor

- APR/Eunomia models secondary sorting at 50,000 tonnes per year. Below that reference scale, per-ton sorting costs rise; the figure is a modeling assumption, not a proven minimum viable size.
- Local collection and MRFs can aggregate and initially separate plastics, but conversion requires further conditioning to a written feedstock specification. Collected volume alone does not establish reactor-ready supply.
- Secondary sorting costs an estimated \$220 per tonne of output, versus \$70 per tonne for baled transport. Replicating sorting near each converter risks multiplying the expensive step to avoid the cheaper one.
- Pool material from multiple collection areas at a regional sorting hub before sizing or siting conversion. Contract the hub's throughput and specification controls first; locate conversion where conditioned feed and product offtake can be secured.

Solve the regional sorting requirement before selecting converter capacity or location. The 50,000-tonne-per-year sorting model supports regional aggregation, not a universal minimum plant size; central conversion is favored by cost structure, not proven utilization.

ExxonMobil Baytown: The Integrated Alternative

Baytown pairs three co-located conversion units with dedicated sorting plants costing \$100M and \$135M. This architecture addresses feedstock conditioning at scale, but undisclosed unit-level utilization means its operating advantage remains unproven.



Baytown configuration

- Three plastic-conversion units are co-located at ExxonMobil's Baytown petrochemical complex.
- Dedicated sorting plants feed the conversion operation.
- Reported sorting-plant investments are \$100 million and \$135 million.
- Conversion is integrated with a site positioned to use its output.

Feedstock control is the bottleneck

- Municipal plastic streams vary in composition and contamination, so collection alone cannot guarantee reactor-ready material.
- Conversion units require a dependable volume of feed that conforms to a written specification at the reactor gate.
- Replicating conversion near each waste source would also replicate expensive conditioning rather than avoid cheap transport.

Own sorting; integrate conversion

- Invest in dedicated sorting plants as capital assets to aggregate and condition plastic before it reaches Baytown's conversion units.
- Keep collection distributed while concentrating specification-sensitive conversion inside the petrochemical complex.
- Evaluate the configuration on disclosed throughput and product disposition when available; unit-level utilization is not public.

The Evidence Asymmetry: Documented Small-Plant Failure vs. Undisclosed Large-Plant Performance

Centralized, integrated conversion is favored by the feedstock-cost ledger, not proven by disclosed utilization. Documented small-plant failures and undisclosed large-plant performance must not be treated as a like-for-like operating comparison.

Underperformance with observable outcomes

- Brightmark Ashley (~300 t/d) demonstrated roughly 5% of nameplate output over about four years; court filings document its subsequent bankruptcy.
- Agilyx/AmSty Regenyx (10 t/d) produced approximately 4,400 tonnes during 2012–2024—about 10% lifetime utilization. It processed polystyrene, not mixed-plastic-to-fuel.
- Renew Phoenix reportedly received feed contaminated at ten times the expected level and never started; its own operating records are not public.
- These cases establish that size alone does not ensure throughput. They do not establish that every small converter fails.

Integrated performance remains unverified

- ExxonMobil Baytown has three co-located conversion units supplied by dedicated sorting plants, but unit-level utilization is undisclosed.
- The APR/Eunomia cost model estimates baled transport at ~\$70/ton versus ~\$345/ton for primary and secondary sorting combined; this favors aggregated conditioning over replicated local sorting.
- Those costs support a regional-sorting, integrated-conversion topology—not a claim that Baytown has demonstrated sustained design-rate operation.
- Apply identical disclosure tests to large and small plants: lifetime throughput versus nameplate, material loss, product disposition, availability, and incident history.

Distributed Contact, Centralized Conditioning: The Recommended Architecture

Collect and initially separate plastic locally, but aggregate secondary sorting at regional scale before sending specification-controlled feed to conversion integrated with its product user. Baled transport costs about \$70/ton; replicating expensive sorting near every converter is the wrong trade.

Local collection and primary sorting

Activities

- Collect mixed plastic near households and businesses, where local access and collection routes matter.
- Use municipal material recovery facilities (MRFs) for primary separation before baling and transport.
- Account for the estimated 35% of collected film lost at the MRF; do not count it as available reactor feed.

Deliverables

- Collected plastic stream
- MRF-separated bales
- Recorded film losses and composition

Regional specification sorting

Activities

- Aggregate material across collection areas for secondary sorting, modeled at a 50,000 t/yr facility.
- Sort and test against a written conversion specification, with measured contamination and contractual rejection rights.
- Contract sorting capacity before building conversion; per-ton conditioning costs rise below the modeled scale.

Deliverables

- Written reactor feed specification
- Contracted sorting capacity
- Tested, rejectable feedstock bales

Integrated conversion and offtake

Activities

- Deliver conditioned feed to a conversion site integrated with the product's user, such as a petrochemical complex.
- Verify conformance at the gate, then track stable operation, lifetime tonnage, material loss, and saleable output.
- Link product offtake and any available gate fee to operating economics; return contamination and performance data to the sorting hub.

Deliverables

- Demonstrated reactor throughput
- Documented product disposition
- Feed-quality feedback to sorter

What Strong Operators Can Show

A written, enforced feed specification is the clearest leading indicator of execution quality. Fund replication only when operators also demonstrate sustained throughput, accountable sorting and verified product disposition.

Strong execution: enforce the feed specification

- Test every incoming load against a written conversion specification; record contamination and retain contractual rights to reject nonconforming feed.
- Contract regional sorting capacity before building the converter, with clear accountability for delivering conditioned material.
- Report cumulative processed tonnes against nameplate and sustained operation near design rate—not merely a short run at minimum stable rate.
- Disclose material-loss percentage and final product disposition, distinguishing petrochemical sales from output burned as fuel.
- Maintain a clean fire and incident record; approve a second unit only after a full year of demonstrated availability.

Weak execution: substitute capacity claims for evidence

- Quote design capacity without lifetime processed tonnage or an independently checkable utilization period.
- Accept unspecified “mixed plastic” without gate tests, contamination logs or enforceable rejection rights.
- Rely on a municipal collection stream whose composition and delivery terms the operator does not control.
- Treat secondary sorting as a supplier’s problem instead of contracting sufficient capacity and a written output specification.
- Announce replication before documenting sustained availability, material losses and where the product actually went.

Executive Action: Underwrite the Specification, Not the Tons Per Day



Investment gates for plastic-to-fuel

- Require a written incoming-feed specification, gate testing and contractual rejection rights. Identify who owns sorting and how contamination is measured and logged.
- Contract regional secondary sorting capacity before financing conversion. Favor local collection and MRF sorting, a regional conditioning hub, and conversion integrated with the product's user.
- Demand lifetime tonnes processed versus nameplate, material-loss percentage and final product disposition. Gate a second unit on a full year of demonstrated availability near design rate.
- Apply the same disclosure standard to large integrated plants: their utilization is undisclosed. Centralized conversion is favored by sorting and transport economics, not proven operating performance.

The investable unit is a specification-controlled supply chain, not a reactor rated in tons per day. Fund replication only after sorting ownership, feed acceptance and sustained saleable output are demonstrated.