Evaluating supercritical and hydrothermal gasification claims

A buyer's due-diligence standard for wet-waste and sewage-sludge treatment

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Four questions separate a real supercritical process from a promotional one. This is the test we apply before we will engage with any supercritical or hydrothermal technology, including our own. A process that is real can produce all four. A process that is not will produce none of them, and will defer every one to a later stage, a non-disclosure agreement, or a customisation phase.

The four questions

01 **Show the closed elemental balance on carbon, hydrogen, oxygen, nitrogen and sulphur.**

Not a total-tonnage balance. Tonnage closes on rounding and stated ranges while the elements do not.

02 **Show the gas chromatography trace, including the carbon dioxide peak, on a method suited to percent-level concentrations.**

Ask which detector and which method. A trace-level technique cannot see the thing in dispute.

03 **Show the start-up energy balance and the steady-state energy balance, separately.**

One number covering both conceals the question. A cold start needs external energy by definition.

04 **Name the licensor of the core IP, the ultimate beneficial owner, and one contactable operating reference that can be independently visited and audited.**

Often the fastest of the four to resolve, and the one most likely to end the process.

The checklist

Ask for	A sound answer	Stop
Closed elemental balance, C H O N S	Elements close within a stated tolerance, on a named basis	Tonnage-only balance. Carbon out exceeds carbon in
GC trace with the CO2 peak, method named	Percent-level method, trace provided, composition consistent across documents	Trace-level method. Composition tabulated but no trace. CO2 absent
Start-up and steady-state energy balances, separately	Endothermic duty stated. Recuperator effectiveness quoted fouled, not clean	Zero external energy. Heat recovered from recycled gas without oxidation
Licensor, ultimate beneficial owner, one auditable reference	Named, in an acceptable jurisdiction, site visitable without the vendor present	Verification deferred to an NDA. Vendor is sole channel. Reference is a different process
Zoned materials schedule, salt and fluoride strategy	Alloy by zone, nameplate salt duty, fluoride capture, upstream dosing rules	Single alloy for the envelope. No corrosion claimed. Decades of life asserted
Whole-gas higher heating value and Wobbe, with composition	Calculated from the stated whole-gas composition	Sub-stream calorific value quoted as whole-gas
Consistency across every document provided	One set of numbers throughout	Different yields in different documents, none reconciled

The last line costs nothing and finds more than any other. Where a package contains several documents, put their yields side by side. A real process gives one answer.

This is not a claim that supercritical treatment does not work. It does, and for wet contaminated solids it is the most promising route available. Nor is it a checklist any early-stage technology passes completely. What separates a real process from an unreal one is not the absence of gaps, but whether the developer can tell you where they are and what will close them.

A standard the author will not sit under is not a standard

Our product gas contains carbon dioxide, in the range the chemistry requires. Our process needs external energy at start-up. Our hot-zone alloy is held open pending site chloride and fluoride data. Our operating reference does not yet exist, because the first unit is the pilot. Two of those are open items, and that is what an early-stage technology looks like described accurately.

On PFAS, the claim we are asked about most: an installed unit ends the PFAS land-exposure pathway for that works on day one, with nothing exported. Destruction is a different claim, and ours is a monitored co-benefit being mass-balanced on the pilot. Until that data exists we quote no destruction efficiency. Sites needing a warranty today should go to an oxidative process.