CLOSING THE CIRCLE · NOVEMBER 8, 2026

From Community Waste to Community Fertilizer

A six-phase plan to turn the methane and nutrients already flowing through our wastewater digesters into fertilizer for local farms.

By Ronnie Patterson



Illustration (AI-generated) — not a photo of a real site

THE DECISION IN PLAIN LANGUAGE

The idea is technically sound

Use **existing digesters** to turn sewage and other organic waste into useful methane, make **nitrogen fertilizer** from that methane, and **recover nutrients** from the remaining liquids and solids.

This moves *From Waste to Harvest* from explanation into execution — while keeping Ronnie's central safeguard: keep pharmaceuticals, heavy metals and persistent chemicals out of the loop wherever possible.

The strongest opening

Probably not an ammonia factory at every sewer plant, but a **regional partnership**:

- Wastewater utilities recover nutrients and supply cleaned gas
- Experienced chemical operators make ammonia
- Farmer cooperatives distribute fertilizer

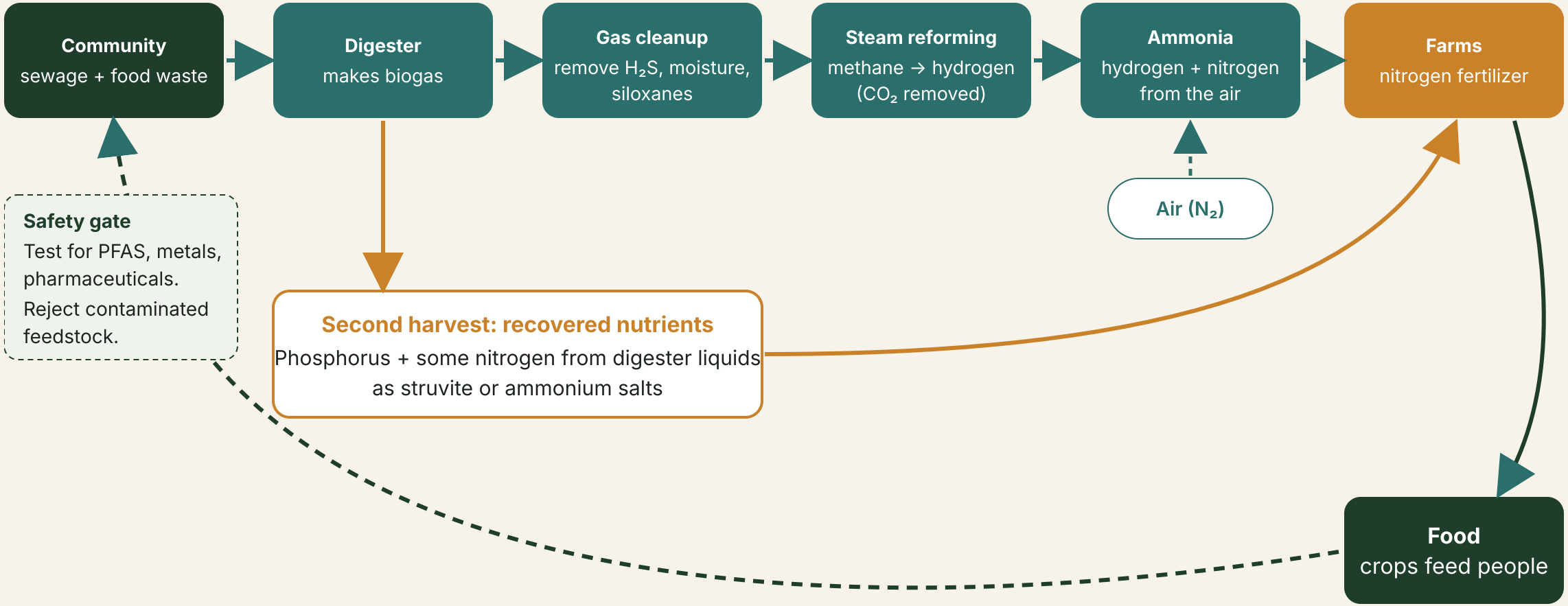
Compare this against a small on-site unit before choosing.

Protect sanitation first: fertilizer production must never compromise sewage treatment.

Named organizations are research candidates, not committed partners. Nobody was contacted.

HOW THE CIRCLE CLOSES

From waste to farm to table — and back



...and the community's waste starts the circle again

Diagram drawn from the report. Biogenic gas does not mean zero emissions; product purity must be verified, not presumed.

SECTION 1

Two harvests, not one

Harvest 1

New nitrogen fertilizer

Clean the biogas, reform methane with steam into hydrogen, remove carbon dioxide, and combine hydrogen with nitrogen separated from air to make ammonia.

- The nitrogen comes from **air**, not methane.
- Reforming is mature chemistry.
- Gas-derived ammonia is a separate product from sludge — but its purity still needs verification.

Harvest 2

Recovered nutrients

Capture existing phosphorus and some nitrogen from digester liquids as struvite; consider ammonia stripping and acid absorption to make ammonium salts.

- Struvite recovery generally treats a concentrated sidestream, not every pound entering the sewer.
- Use residual biosolids only where testing and law support it.
- Keep separate mass balances — never count recovered nitrogen twice.

Digesters need heat: diverting their fuel without replacement would undermine operation. Nothing is presumed safe just because the feedstock is renewable.

Source: the report, Section 1

SECTION 2 · SEQUENTIAL EXECUTION

Six phases, each with a decision gate

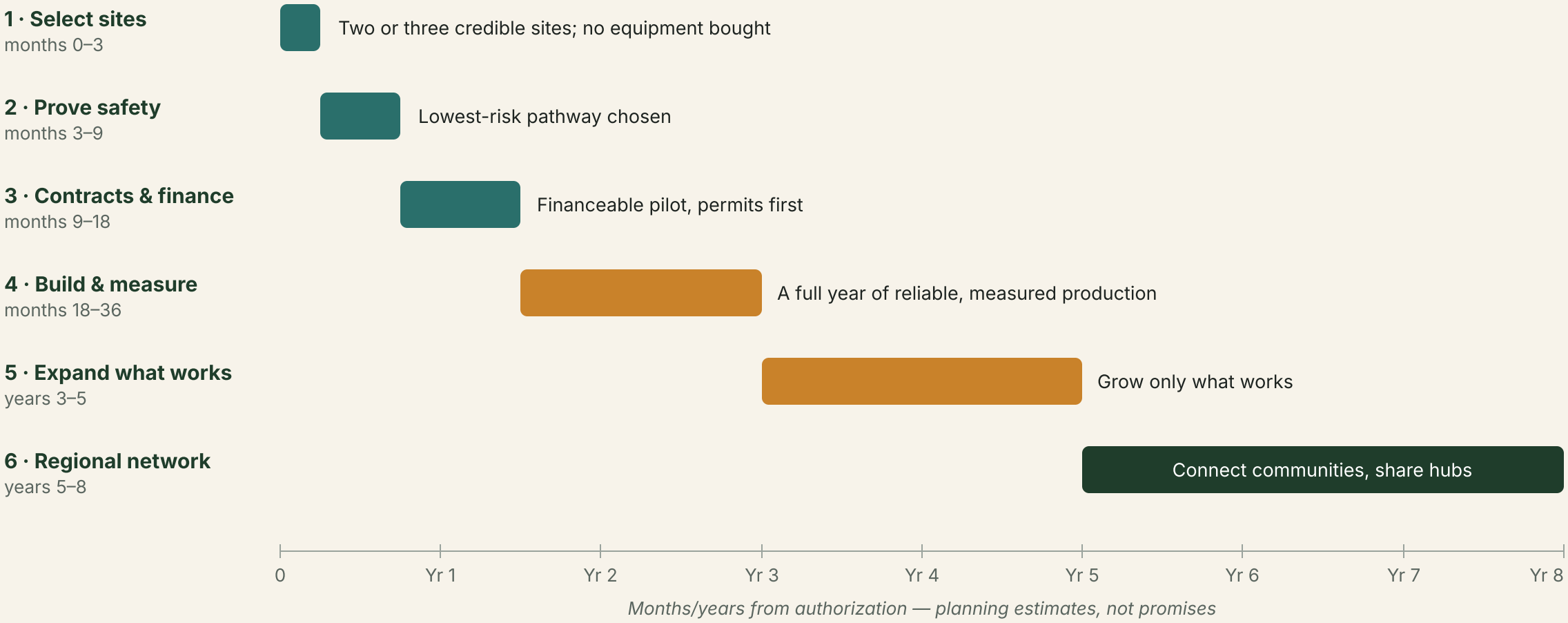


Diagram drawn from the report's phase timings

PHASES 1–3 · MONTHS 0–18

Plan carefully before building anything

Phase 1 · months 0–3

Ownership & site selection

Appoint a municipal sponsor and a small group (utilities, fertilizer operations, farmers, independent engineering). Gather twelve months of gas, heat, flaring, nutrient and contamination data. Rank sites — and include a “do not convert” option.

> Gate: subtract committed gas, plant heat and existing energy value before picking a lead.

Phase 2 · months 3–9

Prove safety, compare routes

Audit industrial dischargers; test for PFAS, metals and pharmaceuticals. Compare nutrient recovery alone, RNG to an existing ammonia producer, and modular on-site production. Talk with neighbors about odor, traffic and ammonia accidents.

> Gate: independently reviewed feasibility study that works even at low credit prices.

Phase 3 · months 9–18

Contracts, permits, finance

Negotiate gas supply, waste delivery, fertilizer purchasing and credit ownership. Separate wastewater costs from chemical-manufacturing costs. Get permits before irreversible commitments.

> Gate: signed agreements, funded contingency, clear liability — no rushing unsafe construction to meet a tax deadline.

Goal of Phase 3: make a pilot financeable without putting household sewer bills behind speculative technology.

PHASES 4–6 · MONTH 18 TO YEAR 8

Prove it, grow it, connect it

Phase 4 · months 18–36

Build & independently measure

Install nutrient recovery first where useful. Add a limited gas-to-fertilizer demonstration or contracted ammonia production. Meter leakage, nutrient output, energy use and uptime; test every product batch.

> Gate: a full year of reliable performance, farmer acceptance and audited cost per pound of nutrient — not a ribbon-cutting.

Phase 5 · years 3–5

Expand proven production

Expand recovery, add clean food waste where capacity permits, and contract with a regional ammonia producer or warranted modular supplier. Arrange seasonal storage and nutrient-management help for farmers.

> Gate: secure buyers, performance guarantees, affordable debt and unchanged contamination standards.

Phase 6 · years 5–8

Replicate a regional network

Standardize testing and contracts, aggregate qualified gas, and share processing and distribution hubs. Consider source-separated toilets mainly in new development.

> Gate: evidence that replication lowers cost and truly displaces fossil fertilizer.

Phase 5: do not encourage overapplication to increase sales.

SECTION 3 · EXISTING ENTITIES WORTH EVALUATING

Municipal anchors

CANDIDATE	ROLE	WHAT THE REPORT FOUND
Philadelphia Northeast WPCP PWD · PGW · PEA	First local screening choice	Eight digesters; ~450,000–510,000 thousand cubic feet of annual biogas; 5.6 MW cogeneration. A later solicitation seeks enhanced biogas monetization with PGW. Spring-2026 construction target is a schedule, not proof — confirm status.
Newtown Creek NYC DEP · National Grid	Strongest measured RNG benchmark	Nearly 286,000 MMBtu of RNG (June 2025–May 2026), 85% uptime; 54,000+ wet tons of food scraps co-digested. Gas already serving another market isn't automatically available.
DC Water Blue Plains Bailey Bioenergy Facility	Operating & training partner	Up to 10 MW of electricity (~⅓ of plant demand) plus Class A biosolids. Target surplus or additional recovery — not an existing methane-to-ammonia plant.
Madison Nine Springs with Ostara	Nutrient-recovery reference	2014 installation recovering phosphorus/nitrogen into Crystal Green; two systems, 1,300 tons/year stated capacity; reported $3M cost is historical, not a 2026 quote.

Research candidates only — no one has been contacted. Report sources [1–5].

Partners, precedents and modular comparators

Vanguard / TotalEnergies

Three farm and food-waste RNG facilities reported complete April 2026, ~870,000 MMBtu/yr combined. Gas is committed to AstraZeneca — a developer to evaluate, not unclaimed gas.

Divert · Longview, WA

Food-waste depackaging, 100,000 tons/yr capacity, pipeline injection and expected digestate fertilizer. A cleaner feedstock than sewage, but plastics and chemicals still need control.

Yara · Cubatão, Brazil

Closest verified chemical precedent: first biomethane-based ammonia deliveries, Dec 2024. Claims up to 75% emissions cut — verify independently.

Fertiberia · Spain

Converting an existing 600-tonne/day ammonia unit using renewable hydrogen (electrolysis, not sewage methane). Lesson: keep the equipment, swap part of the feedstock.

TalusAg · Kenya & Landus

~1-tonne/day solar-powered unit with a 15-year purchase agreement; work with Iowa's farmer-owned Landus co-op. Shows modular and cooperative models.

What these prove — and don't

None is a sewage-methane-to-ammonia plant. They show pieces of the circle working; company claims are not independent certification.

Report sources [6–10]

SECTION 4 · SCALE

Substantial, but not unlimited

Worked estimate using Newtown Creek's measured RNG — **not** a Philadelphia forecast.

286,000
MMBtu/year of RNG reported (includes food-waste co-digestion)

6,800–9,700
tonnes of ammonia/year, energy-equivalent (planning range)

12.3–15.4M
pounds of nitrogen/year (5,600–7,000 tonnes, at a less-efficient 32–40 GJ/t)

82k–103k
acres at an illustrative 150 lb N/acre — an assumption, not advice

That is roughly **86–108%** of the assumed demand of Lancaster County's 95,549 acres of grain corn (acreage still to be confirmed) — but only **8–10%** of a million-acre regional crop base.

Assumes all RNG could be reassigned; using 10% yields 10% of these numbers. Sources [3, 11, 12].

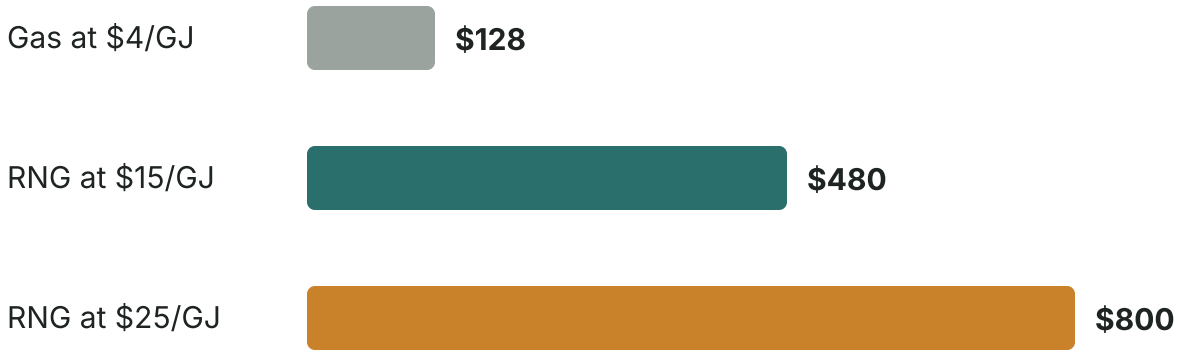

Illustration (AI-generated) — not a real farm

SECTION 5 · COSTS AND THE BIGGEST HURDLE

The chemistry works. The price is the fight.

The hardest obstacle: competing with inexpensive fossil ammonia while giving up existing gas, heat and renewable-fuel-credit revenue.

Gas cost alone, per tonne of ammonia (at 32 GJ/tonne) — illustrative



Feedstock sensitivity only — not market quotes. Labor, maintenance, financing, electricity, storage and transport come on top.

- IEA (2021) put emerging near-zero routes at **10–100% above** conventional production — historical context, not a 2026 forecast.
- A small unit can lose money before financing begins.
- Direct nutrient recovery may beat making new ammonia; buying processing services may beat owning a chemical plant.
- No site-specific capital cost is defensible without engineering and quotes.

Chart drawn from the report's own illustrative figures. Source [11].

SECTION 6 · GOVERNMENT SUPPORT, WITH 2026 LIMITATIONS

What exists — and the fine print

PROGRAM	WHAT IT COULD DO	LIMITATION
Clean Water SRF / WIFIA	Supports eligible plant energy work incl. methane capture, co-digestion, conversion	Merchant fertilizer manufacturing isn't automatically eligible
45V hydrogen credit	Ten years of credits; often-quoted max $3/kg; construction must begin before Jan 1, 2028	Flaring baseline for wastewater methane; pipeline certificates not assumed sufficient today
45Z & RFS	Reward qualifying transportation fuels (45Z extended through 2029)	Gas redirected to fertilizer doesn't automatically keep these benefits
Section 48 biogas	Legacy investment credit	Generally required construction start by Dec 31, 2024
USDA REAP / loan guarantees	Rural producer support; fertilizer-program precedent	REAP grants not being accepted; biodigester guarantee pause extended through Dec 31, 2026
Pennsylvania / Philadelphia	PENNVEST/DEP review; Philadelphia GESA contracting	GESA is a contracting mechanism, not a grant

Most needed: independent demonstrations, contaminant research, performance-based financing, and incentives that reward verified low-carbon fertilizer — recommendations, not current entitlements.

Report sources [13–22]

THE SAFEGUARD AT THE HEART OF THE PLAN

Keep the bad stuff out of the loop

- **Class A** addresses pathogens — not the absence of PFAS, metals or drugs.
- EPA's July 2026 PFAS biosolids guidance is still a **draft**; its 1 ppb modeled-risk scenarios are not a universal legal limit.
- Maine's land-application restrictions show why a **disposal fallback** matters.
- Digestion does not reliably eliminate these contaminants — test products and residuals separately.

Source control, in practice

- Industrial discharger inventories
- Enforceable discharge limits where authorized
- Medicine take-back (covers unused drugs, not those excreted after treatment)
- Safer procurement and upstream PFAS reduction

> Reject contaminated feedstock rather than dilute it.

Wastewater permits are not fertilizer certification. Report sources [23–24].



Illustration (AI-generated) — not real people or places

SECTION 7 · PUBLIC FUNDING THROUGH MARKETS

Community money, community ownership

Municipal & green bonds

Finance proven treatment assets. DC Water's $350M 2014 green century bonds (for Clean Rivers, not ammonia) show market access. Tax-exempt financing can reduce 45V credits.

Community investment

Reg CF: up to $5M in twelve months via a registered intermediary. Reg A: $20M Tier 1 / $75M Tier 2. Ceilings, not grants — don't shift experimental losses to residents.

Co-ops & offtake

Farmer equity aligns production with real demand. Multi-year purchasing with price floors and quality conditions — farmers never obliged to buy unusable product.

Partnerships & markets

Utilities keep sanitation assets; specialists take defined risks, open-book. Carbon and nutrient credits are upside — never sell the same benefit twice.

Treat volatile or unapproved credits as upside, not the basis of debt repayment. Existing methane capture is not automatically "additional."

Report sources [6, 10, 14, 25, 26]

FIRST PRACTICAL DECISION

Prepare a small feasibility brief

Philadelphia
Lead site — screen PWD, PGW and PEA first

Newtown Creek
Benchmark — the strongest measured RNG system

Nutrient recovery
The lower-risk first investment (Ostara model)

Existing producer vs. modular
Competing options for making the ammonia

“Ronnie’s circle is achievable in pieces. Measure safety, recovery, farmer needs and affordability — then expand only what works.”

From the report’s closing recommendation

HONEST CAVEATS

What this briefing is — and isn't

- Named organizations are research candidates, not committed partners. **Nobody was contacted**; no outreach, application, or investment solicitation has occurred.
- Timelines are planning estimates from authorization, not promises or published schedules.
- Scale figures are worked estimates from one plant's measured RNG, with stated assumptions — not a Philadelphia forecast.
- Cost figures are illustrative sensitivities, not market quotations.
- Company statements are not independent certification.
- Program rules reflect the report's check on November 8, 2026 (ET) and can change.
- Some sources could not be fetched directly (USDA Lancaster profile, two EPA pages); confirm before decisions.
- Images marked "Illustration" are AI-generated, not photos of real sites. Diagrams and charts are drawn from the report's own figures.

Full report: "From Community Waste to Community Fertilizer" — a sequential execution plan, with 27 numbered sources.