

THE SYRACUSE CIRCULAR INDUSTRIAL MODEL

Capturing durable regional capability from I-81, Micron, and infrastructure investment

WORKING PAPER 7.0 | INTEGRATED OPPORTUNITY, EVIDENCE & MOBILITY REVISION | 9 OCTOBER 2026

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NON-CONFIDENTIAL DISCUSSION DRAFT — editorial and technical approval pending

Purpose

A feasibility, market-formation and civic-strategy proposal; not an engineering design, procurement commitment, legal opinion or investment memorandum. It intentionally withholds proprietary formulations, process windows, algorithms and counterparty-confidential terms. It preserves the five evidence labels from Version 6.0 and separates existing facts from hypotheses and proposed decisions.

Revision authority and limitations

Version 6.0 was recovered from indexed text because its original binary PDF/DOCX could not be exported in this runtime. Section prose and citations are retained as a documentary baseline where recoverable; complex tables are presented as editable text rather than silently fabricated. V7 additions are explicitly tagged. This is a candidate successor, not an authorized final public policy or partner endorsement.

Editorial summary: what Version 7 changes

Circular CNY proposes that the historic I-81, Micron and public-infrastructure investment window be used to test whether Central New York can retain a second dividend: qualified material markets, durable suppliers, reusable testing and operating know-how, skilled work, productive assets, and greater locally retained value after construction peaks. The proposition is a disciplined market-formation method, not an instruction to build a universal processing plant, favor local treatment regardless of economics, or change existing procurement decisions.

The strongest immediate material candidates remain glass-derived supplementary cementitious material and source-separated concrete for qualified aggregate applications. Existing Syracuse pilot activity, NYSDOT approved-list and earthwork routes make these credible starting points, not proof that a particular future OCRRA stream, owner, processor or buyer has been commercially linked. OCRRA's reported recovery statistics and disposal choices should be verified at source, including data limitations. A project's technical possibility is distinct from its commercial feasibility. [1][5][6][9][28][29][30]

The wider opportunity portfolio is explicitly competitive. Reclaimed industrial water is a possible shared-infrastructure service, not an automatic third concrete input. Feedstock networks could coordinate small municipal, agricultural, forestry, food and industrial sources where segregation, transport and buyers support value; specialized or hazardous streams may belong in established distant treatment channels. Additional families - biological and carbon products, repair, metals/electronics, energy/heat, legacy recovery and manufacturing residuals - are screening domains and must not be described as committed facilities.

The five evidence gates - Technical, Commercial, Environmental, Resilience and Distribution - are independent. They should apply to the full chain of owners, processors, haulers, producers, buyers, workers and affected communities. A technically sound loop still fails if there is no delivered margin, if life-cycle burdens exceed the alternative, if the business depends on a single irreplaceable party, or if local people absorb risk without meaningful upside.

The human Second Dividend has to be evaluated as deliberately as tonnage or carbon: quality of work, access for people without four-year degrees, paid skill progression, safety, repeat supplier relationships, durable local profits and ownership. Syracuse Build and New York's ON-RAMP supply existing training infrastructure, but neither should be represented as an authorized Circular CNY partner without agreement. Micron's employment figures are project projections, not Circular CNY job forecasts. [24][25][26][31][32]

The first recommended step is a bounded Phase 0 opportunity-screening effort. In an illustrative 90-day window, identify credible streams and buyers, screen preliminary business cases, map delivery options and produce a decision-ready portfolio with uncertainty visible. A success may be an advancement, a controlled trial, a call for more evidence, deferral, or rejection. Capital, permitting, operating authority and public participation remain separate downstream gates.

This Version 7.0 integrates that outcome-led roadmap and the 18-page website's approved public presentation while preserving the source logic and conservative boundaries of Working Paper 6.0. It is a non-confidential, evidence-led discussion draft, not an engineering design, procurement approval, legal opinion, investment memorandum, or commitment by any named institution. Published project figures and standards are dated and must be reconfirmed at the actual decision time.

Reading the evidence states

STATE

HOW TO READ IT

Documented	Supported by public records or authoritative specifications.
Established pathway	Generic or authorized-use route exists; local linkage remains to be proved.
Hypothesis	A mechanism or local possibility requiring explicit falsification.
Proposal	A recommended action for consideration, not approval.
Unknown	Requires counterparties, sampling, contract, engineering or field work.

PART I — THE OPPORTUNITY

Why this moment matters, what the Second Dividend means, and why the window should be investigated now.

1. Why Now: A Regional Convergence, Not a Normal Construction Cycle

Central New York's opportunity comes from concurrency. NYSDOT has begun Phase Two of the I-81 Viaduct Project, including a \$2.1 billion Contract 6 — the largest construction contract in department history — focused on dismantling the viaduct, reconstructing I-690, rehabilitating 25 local streets, and building infrastructure for the Community Grid. Micron has moved from site preparation to vertical construction in Clay and describes up to four fabs over more than two decades. New York is also tightening embodied-carbon requirements for state concrete procurement, including Environmental Product Declaration reporting and lower GWP limits scheduled for 2027. [3][4][8][11]

These programs were not designed as one system and should not be treated as one. Each has distinct engineering, legal, procurement, environmental, schedule, and public-accountability obligations. The opportunity is narrower and more practical: determine whether additional regional value can be created at the interfaces among them without disturbing their primary missions.

The scale and duration matter. Long-running infrastructure and manufacturing programs create repeated demand rather than a single transaction. That can support learning curves, supplier development, equipment utilization, qualification work, and durable buyer relationships in ways that a one-off project cannot. It also gives the region time to test small pathways before deciding whether any deserve permanent infrastructure.

Adversarial test If the proposal requires reopening committed I-81 design decisions, inserting unqualified materials into critical structures, or making Micron's schedule dependent on an experimental supply chain, it is designed incorrectly.

2. The Second Dividend

The first dividend from infrastructure investment is the thing purchased: the road, fab, utility, bridge, water system, or building. The second dividend is the capability created around the investment: suppliers, material knowledge, testing and qualification competence, logistics, reusable data, workforce capability, durable contracts, operating know-how, and productive assets.

This distinction matters because the construction surge itself is temporary, while the capabilities created around it can persist. A concrete producer that learns to qualify and reliably use a new local supplementary cementitious material can serve future projects. A laboratory that develops regional materials expertise can test future feedstocks. A local processor with repeat customers, transferable know-how, and equity is more durable than a one-time subcontract. A regional evidence system that records what worked and what failed reduces the cost of the next decision.

The Second Dividend is therefore not a claim that every project must be locally sourced or every waste stream must stay nearby. It is a question about whether major investment can deliberately create additional productive capacity when the economics and public value support it. Signature principle The objective is not to increase spending. It is to increase the lasting productive value generated by spending already occurring.

2.1 The second dividend must outlast the first buyer

[V7 expansion / proposal] Durable value is not measured by the number of named projects. It is demonstrated when a supplier has repeat customers beyond the originating program; when a laboratory or workforce credential can serve multiple future transactions; and when the region retains competitively useful know-how and productive assets. Three accounts should be reported separately: project benefits (the first dividend), market formation (repeat materials and services), and distributional gains (who earns wages, profits, ownership and decision rights). Double-counting the same contract in several accounts is prohibited. A project can deliver the first dividend without achieving the second; that is not a reason to misstate its performance.

[Proposed verification] Each credited capability needs an identified owner, at least one plausible repeat user or customer, evidence of operating life beyond the first construction activity, and a mechanism for local benefit that can be measured. A press announcement, training enrollment or nonbinding expression of interest is not an outcome by itself.

3. This Is a Mechanism for Goals Syracuse Already Has

The City's Community Grid Vision Plan already calls for economic gain from the Community Grid to be inclusive, build shared community wealth, reduce disparities, increase access to jobs and education, and foster citizen-developers. Mayor Sharon Owens' 2026 State of the City similarly emphasizes job creation, household stability, generational wealth, and supplier opportunities flowing from Micron-related growth. [2] [3] The relevance is practical. The model does not ask Syracuse to adopt a new civic ideology. It asks whether a physical-industrial mechanism can help operationalize outcomes the City has already said it wants — and whether those outcomes can be measured rather than inferred from total project spend.

Existing civic objective Potential circular-industrial mechanism Shared community wealth Track wages, supplier profit, ownership, productive assets, and retained capability separately rather than treating all "local spend" as equivalent. Supplier development Create repeatable pathways for logistics, processing, testing, materials preparation, equipment services, and qualified manufacturing.

Community Grid benefit Use I-81 as a source of material-flow evidence and a potential proving environment for already-permitted applications. Climate / resilience Require conservative lifecycle and resilience screening rather than assuming recycled = sustainable. Generational wealth Test ownership and capital structures that preserve upside locally without shifting disproportionate debt or environmental risk to local participants.

4. What Is New Here — and What Is Not

Industrial symbiosis is not new. Recycled aggregate is not new. Glass pozzolan is not new. Local procurement, eco-industrial development, anchor-institution strategies, and supplier-development programs are not new. The literature has described exchanges of material, water, energy, and by-products for decades, and the most studied systems often evolved through bilateral commercial relationships rather than top-down master planning. [13][14] The proposed contribution is the deliberate integration of seven mechanisms during a historic regional buildout: (1) anchor demand; (2) material-flow intelligence; (3) formal qualification and specification mapping; (4) modular pathway economics; (5) explicit technical/commercial/environmental/resilience/distribution gates; (6) supplier and ownership development; and (7) a documented replication method.

Recent reviews of circular construction identify data availability, traceability, quality assurance, standards, market formation, and coordination as persistent barriers. That makes the information-and-qualification layer a substantive part of the opportunity rather than administrative overhead. [15][16] The model is therefore best understood as a market-making and decision architecture. It does not require one entity to own every asset or transaction. Existing processors and commodity markets should be used first. New physical capacity should be built only when evidence shows that an economically valuable bottleneck remains.

5. What the Model Is — and Is Not

It is not A disciplined way to connect material sources, specifications, processors, buyers, and evidence. A universal recycling mandate. A modular system that starts with the strongest existing pathways. A requirement that every process or refinery be located in Syracuse. A method for separating business economics from public value. A way to count unmonetized social benefits as business revenue.

A framework that uses existing processors and standards first. A justification for duplicating successful incumbent capacity. A way to measure who receives upside and who carries risk. A promise that local contracting automatically creates local wealth. A bounded Phase 0 screen before capital investment. A request to change I-81 specifications, disrupt active construction, or fund an integrated megaproject.

A regional method that can eventually include materials, water, energy, logistics, and industrial by-products. A claim that every candidate stream belongs in concrete or should be circularized at any cost. Design rule Local value does not require localizing every industrial process. Bulky, low-value materials often belong near the source; high-value refining can travel farther; complex metallurgy may require multistate scale. Distributed participation and ownership are compatible with selective centralization.

5.1 A common opportunity screen: resource to qualified market

[V7 reconciliation / proposal] The public site's five-stage model translates the paper's market-formation discipline into a common sequence: (1) Resource - establish source, ownership, volume, variability, current destination and contractual limits; (2) Characterize - determine composition, contaminants, handling requirements and test uncertainty; (3) Compare uses - examine realistic alternative applications, including incumbent outlets and nonlocal markets, with economic, environmental and community consequences; (4) Qualify - map standards, user acceptance, safety, legal permissions, product consistency and allocation of liability; and (5) Market - verify repeat demand, delivered price, counterparties, timing and viable contracts.

The steps are decision gates, not a predetermined production line. Candidates may loop backward, bifurcate, go to specialized regional refiners, or be rejected. A 'hub' initially denotes the capability to coordinate flows

and records; no new aggregation center, treatment plant or monopoly broker is implied. If a competitive existing business already solves a stream at reasonable cost, the program should document that result and avoid duplicative investment.

6. The Window Is Open — But Not Indefinitely

The proposal should avoid artificial urgency, but timing still matters. Procurement packages close. Supplier relationships mature. specifications and operating procedures become embedded. Infrastructure is built once. Material and disposal contracts are signed. The longer the region waits, the more the opportunity shifts from influencing the structure of new supply chains to working around decisions that are already locked. [4] [11] That does not mean the opportunity disappears after the first I-81 or Micron packages. Both programs have long horizons, and public works, housing, supplier facilities, utilities, and future maintenance will continue generating demand. But early investigation has option value: it can identify pathways that deserve qualification before later project packages need them, and it can kill weak pathways before anybody spends meaningful capital.

The correct response to this timing is not to rush into facilities. It is to begin the information, counterparty, and qualification work early enough that later decisions are informed.

PART II — WHAT IT COULD BECOME

From two evidence-rich proof loops to a competitive regional system that can grow only where the economics justify it.

7. The First Two Proof Loops

The first demonstrator should begin with material pathways that already have meaningful technical or institutional pieces in place. That lowers the number of simultaneous unknowns and allows the region to learn the market-formation process before tackling more speculative streams.

7.0 Portfolio sequencing and why the first tests are first

[V7 reconciliation / established pathways with local unknowns] Recovered glass and source-separated concrete remain the two closest material-proof candidates because identifiable uses and specifications already exist. A candidate may nevertheless fail because available volume, legal control, quality, transport, processor capacity, insurance, buyer terms or residuals do not close. Those are separate questions from whether a generic material technology works.

The first two pathways do not consume the entire portfolio. They should create reusable characterization protocols, counterparties and testing relationships that lower the effort required to assess water, biomass, repair, minerals or manufacturing residuals later. Each new family must compete on independently evidenced merit rather than earn a subsidy because it fits the story.

7.1 Proof Loop One: Glass to Cement Replacement

The glass pathway is stronger than a conceptual recycling proposal. OCRRA reported 5,564 tons of glass recycled in 2025. For much of the first half of that year, OCRRA says it paid an average of \$72 per ton to dispose of glass; a later beneficial-use determination allowed up to 3,500 tons per year to be used as alternative operating cover at the Madison County Landfill. OCRRA expects to reach that limit and reports that some glass will still require traditional disposal. OCRRA also notes that much of its countywide recycling data is voluntarily reported and unaudited — a limitation that must remain visible in any feasibility model.

[1] The destination side is also more mature than originally assumed. The City of Syracuse piloted KLAU Industries' recycled-glass supplementary cementitious material in 2024 sidewalk work, using 20% cement replacement, and reported no additional project cost for that pilot. NYSDOT lists KLAU's Pantheon product on its approved list under §711-15 for miscellaneous supplementary cementitious materials. [6][7][9]

That does not prove OCRRA's specific materials-recovery-facility glass can be economically converted into Pantheon or another qualified product. The missing chain still includes feedstock ownership, contamination profile, processor acceptance, capacity, yield, freight, residuals, ready-mix economics, warranty/liability, buyer demand, and long-term terms. KLAU states that its process is designed for contaminated MRF glass and advertises modular production, but those are vendor assertions that require diligence rather than assumptions in a financing model. [10] Documented / established Unknown / must be validated OCRRA has a persistent glass-market problem and a finite current beneficial-use outlet.

Who controls the relevant glass stream contractually and at what transfer price. Syracuse has already used glass cement replacement in City concrete. Whether OCRRA's specific glass meets processor input requirements at acceptable yield. Pantheon is on the NYSDOT approved list. Capacity, freight, processing economics, residuals, and long-term supply terms.

A local ready-mix pathway has been demonstrated. Which future public/private projects will purchase at what price, volume, and warranty allocation. Why this is a good first test The material use is no longer hypothetical in Syracuse. The unresolved question is whether a specific regional waste stream can be connected to an already-demonstrated product pathway with durable commercial terms.

7.2 Proof Loop Two: I-81 and Construction/Demolition Material

The C&D case is simultaneously larger and less certain. OCRRA received 82,016 tons of construction and demolition debris in 2025, but that number is mixed C&D — not 82,016 tons of recyclable concrete. Treating it as clean mineral feedstock would materially overstate the opportunity. [1] The pathway is nevertheless credible enough to screen because NYSDOT already permits recycled Portland cement concrete aggregate in specified subbase and embankment applications. Phase Two of I-81 is dismantling and rebuilding major transportation infrastructure, which creates a relevant source of materials and a visible environment in which existing specifications can be mapped to future uses. [4][5]

The first C&D task is characterization, not plant construction. A representative sampling program should determine the actual fractions of concrete, asphalt, masonry, soil/rock, steel, wood, gypsum, roofing, and residual contamination; current ownership and destinations; processing requirements; and the applications each recovered fraction could legally and economically satisfy.

Hard constraint Transportation, mixture design, quality equivalence, and allocation assumptions can erase or reverse some environmental advantages of recycled aggregate. Recycled is not automatically the lower-impact choice. [17][18]

8. The Long-Term Opportunity: A Regional Circular Industrial Ecosystem

The long-term vision is deliberately broader than the first two loops and deliberately less certain. Once the region has a repeatable way to characterize materials, identify specifications, find processors and buyers, separate public value from enterprise revenue, and govern risk, the same method can screen other regional streams. The portfolio below is a research and market-development agenda — not a list of projects that should automatically be built.

The goal is a modular industrial ecosystem in which pathways can attach, detach, scale, or be rejected independently. Mature pathways should not depend on speculative ones. A failed biochar experiment should not threaten glass economics; a semiconductor-residual study should not service debt on a C&D plant; a metals stream already served by incumbent recyclers should remain in that existing market unless there is a documented gap.

Opportunity family Illustrative candidate pathways — subject to five-gate screening Construction & mineral materials Glass cement replacement; recycled concrete aggregate; reclaimed asphalt; masonry/mineral fractions; soils/rock; low-carbon concrete; precast and nonstructural applications. Biological / carbon materials Clean wood and biomass; controlled biochar applications; organics/anaerobic digestion where local economics support it.

Electronics & metals Whole-system reuse; refurbishment; component harvesting; metal aggregation; specialized refining at the geographic scale that economics require. Water & treatment resources Reclaimed industrial water; shared non-potable systems; resource recovery from treatment residuals where chemistry, regulation, and markets support it. Energy & heat Data-center or industrial waste heat where nearby loads exist; landfill gas; digestion/CHP; process-heat integration.

Advanced manufacturing Semiconductor and other industrial residuals as R&D candidates; no assumption that dilute or hazardous streams belong in construction materials. Information / qualification Material provenance; evidence registry; specification mapping; qualification records; buyer/supplier matching; field-performance feedback. Portfolio rule Candidate pathways compete for attention. The program should publish rejected or deferred pathways as explicitly as successful ones so “Circular CNY” does not become a machine for rationalizing every recycling idea.

8.1 Nine public opportunity families and modular boundaries

[V7 integration / candidate portfolio, not committed projects] The website presents nine opportunity families: construction and mineral materials; biological resources and carbon products; water and treatment resources; landfill and legacy recovery; electronics and metals; energy and heat; advanced manufacturing residuals and support; repair and remanufacturing; and plastics, fibers and composites. These are discovery domains, not approvals. The families overlap operationally, so project records should identify cross-family inputs without counting the same ton twice.

Shared capabilities may include contracts for aggregation, third-party qualification, sampling, provenance, water management, specialized logistics, environmental monitoring and buyer access. None requires a universal municipal database or a new facility. Prefer existing processors, utilities, universities, operators and market infrastructure. Build common assets only when several identified beneficiaries can support their costs and governance. Specialized high-temperature, hazardous or deep-refining needs may rationally remain outside CNY.

9. Why Advanced Manufacturing Changes the Equation

The semiconductor and AI-era buildout matters primarily as an anchor-demand and industrial-capability event, not as a promise of abundant exotic waste feedstock. Micron’s Central New York investment is expected to unfold over more than two decades, creating repeated demand for construction, utilities, logistics, supplier services, maintenance, and operating support. Micron also explicitly describes the project as part of a broader domestic semiconductor ecosystem. [11][12] Large anchor customers can reduce one of the hardest risks in circular-material investment: uncertainty about who will buy qualified output at meaningful volume. A creditworthy buyer or public infrastructure program can make a new processing or

material pathway more financeable when performance, schedule, and price requirements are met. Conversely, no material pathway should depend on one anchor forever; the objective is to use initial demand to establish a diversified regional market.

Advanced manufacturing also creates adjacent questions around water, electronics, batteries, packaging, construction materials, logistics, waste heat, and future process residuals. Some will already have mature recovery markets; some may support local or regional businesses; some will be uneconomic; some may require specialized multistate treatment. The discipline is to classify them correctly rather than force them into a single circular narrative.

10. Why the Market Does Not Automatically Form

A reasonable skeptic should ask: if these exchanges create value, why have private firms not already captured it? In some cases they have — which is why the model uses existing processors first. In other cases, the missing value is blocked not by one technology problem but by fragmented information, authority, incentives, and risk. A material owner may know disposal cost but not construction specifications. A processor may know how to transform a feedstock but lack long-term supply rights. An engineer may accept a material technically but not have a qualified supplier. A buyer may want lower-carbon material but refuse schedule or warranty risk. A public agency may create societal value from avoided disposal without a contractual mechanism that shares enough of that value with the processor.

Lenders may see no financeable project until feedstock and offtake are contracted — while counterparties wait for financing before committing. These coordination failures can strand otherwise useful exchanges. The research literature reinforces this diagnosis: traceability, material data, standards, quality assurance, market formation, and coordination remain persistent barriers in circular construction. [15][16] The justification for a Circular CNY initiative is therefore not to replace markets. It is to reduce the transaction, qualification, information, and convening friction that prevents viable bilateral markets from forming — and then withdraw or simplify once the market can operate normally.

Fragmented actor Typical missing piece Material generator Specification knowledge, alternative buyers, characterization, liability path. Processor Bankable feedstock rights, consistent quality, buyer commitments, qualification evidence. Engineer / public owner Qualified supply, performance evidence, schedule confidence, warranty/liability clarity. Buyer Delivered cost, dependable volume, schedule, performance, EPD/LCA evidence.

Lender / investor Contracted contribution margin, downside coverage, residual outlets, permitting. Community Transparent burden/benefit analysis, siting voice, ownership and accountability mechanisms.

10.1 Feedstock supply networks: aggregation is a service before it is a site

[V7 integration / proposal] A local feedstock network may assemble modest streams from farms, sawmills, food and beverage operations, municipalities, landscaping, industry and water-treatment systems. Economies of density can favor scheduled collection, source segregation, seasonal buffering, shared testing or mobile preparation. However, a route is not a market until ownership, chain of custody, contamination, permitted uses, handling costs, sampling frequency and downstream acceptance are evidenced.

A supply-network study should compare (a) separate direct shipments to existing qualified processors, (b) a logistics-only aggregation service, (c) toll preparation using incumbent capacity and (d) new common physical infrastructure. The selected option must outperform feasible alternatives on delivered quality, full cost, resilience and local burdens. Water residuals, biosolids, food waste and industrial byproducts have

different biological, chemical, regulatory and safety profiles and must not be blended simply because the diagram shows arrows converging on one hub.

11. A Competitive, Unbundled Market — Not a Vertically Integrated Monopoly

One of the most important long-term design principles is unbundling. A local entrepreneur should not need to own collection, material processing, testing, manufacturing, logistics, customer relationships, financing, and shared infrastructure simply to participate. Those functions can be separated where standards and interfaces make competition possible.

The analogy is not literal telecom regulation. It is the principle that shared infrastructure and common rules can support multiple competing service providers. Water/reuse infrastructure, testing capacity, data standards, qualification procedures, transfer facilities, or a material evidence registry may serve multiple participants; collection, preprocessing, hauling, manufacturing, and customer service can remain competitive. Deep refining can occur at larger scale without requiring the same entity to control local collection or customer access.

This architecture also creates a stronger equity model. Entry can occur at different capital levels — collection, logistics, repair/refurbishment, mobile processing, specialized material preparation, testing, manufacturing, or equity participation in shared assets — without pretending that every small business should own an EAF, refinery, or advanced treatment facility.

Potential role Design principle Feedstock owner Retains transparent rights and obligations; can contract with more than one qualified outlet where feasible. Collector / logistics operator Competes on service and efficiency; should not be locked into one downstream platform without justification. Processor Competes on yield, quality, reliability, environmental performance, and price.

Testing / qualification Independent evidence and standards reduce information asymmetry. Manufacturer / ready-mix / product producer Chooses qualified inputs based on performance, price, schedule, and risk. Shared infrastructure owner Provides nondiscriminatory access where common infrastructure is justified. Data / standards layer Uses open interfaces and portable records; avoids becoming a private choke point.

Buyer / anchor customer Creates demand without permanently becoming the only market. Market-design principle Shared infrastructure and transparent rules can be common; commercial services above them should remain contestable wherever practical.

11.1 Reclaimed water is a separate shared-infrastructure opportunity

[V7 expansion / hypothesis and conditional future use] Industrial water reuse is not a third 'first material pathway.' It is a potential shared-service layer. Existing regional treatment and utility assets should be mapped before any proposal for new piping, treatment or storage. Candidate sources include appropriately characterized municipal or industrial treated streams; candidate users could include construction aggregates washing, certain concrete operations, industrial utilities, manufacturing service water or biological processing - only where fit-for-purpose quality, reliability, rights, treatment and approvals can be demonstrated.

Minimum proof includes source ownership and discharge obligations; flow and seasonality; chemistry, microbiology and contaminant variability; applicable water-quality classes and permits; conveyance distance and energy; treatment capital and operations; lifecycle alternatives and residual disposal; who bears outage and liability risk; and which users can commit to sustained demand. A map connection is not a pipe, permitted reuse or operational customer. Drinking-water-quality supplies should not be displaced or

substituted without facility-specific engineering and regulator approval. The opportunity may prove best as reuse within an existing facility, a bilateral arrangement, or no project at all.

12. From Project Activity to Durable Local Value

The economic-development claim should remain narrow and measurable. This model will not “solve the K-shaped economy.” It can test whether more of the value generated by a major infrastructure cycle can remain regionally embedded through wages, supplier profit, know-how, productive assets, and ownership participation. The stronger approach is a Local Value Retention Scorecard rather than one synthetic ratio. Wages and profit are flows; productive assets and equity ownership are stocks; capability and know-how require different measures. Each should be measured transparently rather than collapsed into a number that appears more precise than the methodology supports.

Measurement alone is not enough, however. If the region wants broader ownership, it must test mechanisms capable of producing it. Potential structures include employee ownership, worker or producer cooperatives where appropriate, local operating-company equity, community investment vehicles, shared regional-asset ownership, supplier-development finance, equipment finance that preserves rather than strips ownership, and concession or joint-venture structures.

None is automatically desirable; each has governance, concentration, liquidity, and risk implications. [19][20] [22] Dimension Measure separately Employment Local payroll, hours, advancement, apprenticeships, career mobility. Procurement Local and diverse supplier spend; repeat contracts; movement into higher-value scopes. Enterprise Local operating profit and retained earnings where measurable.

Ownership Percent of productive equity owned locally, by workers, or by community vehicles. Assets Productive assets controlled locally and their durability beyond one project cycle. Capability Certifications, labs, operators, data, IP/know-how, management competence. Capital formation Retained earnings, reinvestment, asset appreciation, or new local investment where measurable.

Failure mode to avoid Distributed liabilities are not distributed wealth. A program fails its social objective if local participants own debt, depreciating equipment, compliance risk, and commodity exposure while outside firms retain customer control, scarce IP, high-margin processing, and appreciating equity.

13. The Human Second Dividend: Work → Skills → Ownership

The material system is only half of the opportunity. Circular CNY should also test whether infrastructure and advanced-manufacturing investment can create broader pathways into the physical economy for people who may never enter the AI economy as software engineers, chip designers, or capital owners. The objective is not to promise job counts before specific pathways exist. It is to identify what kinds of work credible pathways require, how people enter those roles, whether the jobs are safe and reasonably compensated, how workers advance, and whether supplier formation or ownership can convert wages into longer-term economic participation.

Brookings’ 2026 analysis of 148 built-environment occupations found that 83.6% of the 17.3 million workers in those occupations were in roles with below-average measured AI exposure, while 73.8% were in occupations with above-average AI complementarity. That does not make these careers automation-proof, but it supports a practical hypothesis: the physical economy required to build and operate infrastructure may offer comparatively durable and AI-complementary pathways worth deliberately strengthening. [23] Central New York does not need to create a workforce system from zero. Syracuse Build already connects local

residents — especially people historically excluded from construction careers — to pre-apprenticeship, registered-apprenticeship, Build Ready, CDL, HVAC/R, and related pathways.

New York's ON-RAMP program is establishing a flagship Syracuse advanced-manufacturing training center. Micron is simultaneously building apprenticeship, skilled-trade, and local supplier pipelines around its Clay investment. Circular CNY should connect employers and emerging circular-industrial businesses into those existing systems rather than build a parallel training bureaucracy. [24][25][26][27]

13.5 Turning potential roles into accountable advancement

[V7 integrated workforce test / proposal] Each pathway dossier should identify work at all relevant stages - collection, transport, sorting, processing, industrial maintenance, quality assurance, environmental operations, manufacturing, technical services and market development. For each likely occupational family, distinguish entry eligibility, mandatory licenses, paid training, working conditions, safety exposure, portability of skills, advancement pathways and known employer demand. 'Jobs created' must not be inferred from theoretical plant throughput. Baseline current employment and substitution/displacement risks first.

Workforce institutions such as Syracuse Build and ON-RAMP are real programs [24][25]; that does not establish that they have agreed to supply workers to Circular CNY. Any partnership claim requires authorization and a defined pathway. Ownership vehicles should undergo an independent risk and diversification review, so participants do not receive only debt and regulatory exposure while another party retains pricing control, customer relationships and appreciating assets.

[Suggested metrics] Percentage of roles accessible without a four-year degree; employer-verified openings; wage and benefit trajectories; safety; paid credential completion; retention and progression at 6, 12 and 24 months; repeat procurement from qualified local suppliers; employee or local equity with governance protections. Publish negative results alongside successes.

13.1 A mobility ladder, not a single job category

The workforce hypothesis is best understood as a ladder with multiple entry points:

- • Entry / bridge roles — material handling, construction labor, collection/logistics, and site support accessed through high school/GED pathways, paid bridge programs, and pre-apprenticeship.
- • Credentialed operator roles — CDL drivers, equipment operators, crusher/screener operators, water/industrial operators, and similar roles reached through short credentials, apprenticeship, and employer training.
- • Skilled technical roles — mechanics, electricians, HVAC/R, instrumentation, QC/laboratory, environmental, and materials technicians reached through registered apprenticeship, technical certificates, and associate pathways.
- • Advanced / supervisory roles — forepersons, plant supervisors, estimators, logistics managers, QA/QC leads, and materials specialists built through experience and stackable credentials.
- • Enterprise roles — hauling contractors, equipment-service firms, processing businesses, testing laboratories, specialty suppliers, and local operating companies that can hold customers, profit, and assets.

- Ownership pathways — employee ownership, cooperatives, local operating equity, community

investment vehicles, and other structures that may allow workers and local firms to participate in residual cash flow and asset appreciation, subject to governance and diversification safeguards.

13.2 Job quality is a design requirement

A jobs strategy becomes hollow if it produces only low-wage, unsafe, unstable work while higher-value assets and customer relationships remain elsewhere. The Distribution gate should therefore include an explicit job-quality and mobility test: wage and benefits, safety, schedule stability, retention, access to paid training, credential portability, advancement, and the existence of pathways from employee to supplier or owner where appropriate. “Green jobs” is not an acceptable proxy for job quality.

13.3 Workforce and ownership metrics

The demonstrator should measure employment and mobility separately from broader local-value metrics. At minimum: local hires; share of roles not requiring a four-year degree; wages/benefits; safety; paid training; credentials; apprenticeship completion; promotions and wage progression; retention; repeat employer demand; local supplier firms created or expanded; repeat supplier contracts; productive assets controlled locally; and worker/local equity participation where structured. The important metric is not only how many people enter the system, but whether they can move upward within it.

13.4 What this does — and does not — claim

Circular CNY should not claim that a circular industrial network will “solve” the K-shaped economy, nor that every pathway will create large numbers of jobs. The narrower claim is testable: can a historic infrastructure and advanced-manufacturing buildout be structured so that more people can enter durable physical-economy careers, acquire portable skills, create supplier businesses, and retain a larger share of productive upside locally?

14. What Success Could Look Like by the End of the Decade

The paper should not promise a specific 2030 or 2031 outcome before Phase 0 exists. But a credible future-state scenario helps distinguish the intended destination from the first experiment. If the model works, a mature Circular CNY could plausibly include:

- A public evidence and pathway registry showing active, rejected, deferred, and commercial material loops with clear evidence states and limitations.
- Several proven material pathways with repeat feedstock and buyer contracts — alongside rejected pathways that are documented transparently.
- Existing regional processors expanded or better utilized before duplicative facilities are built.
- Multiple anchor buyers rather than dependence on a single hyperscaler, public agency, or construction project.
- Routine understanding among local suppliers of NYSDOT/City qualification pathways, testing requirements, and procurement timing.
- Expanded local testing, characterization, laboratory, equipment, logistics, and materials-management capability.
- Locally owned and worker-participating businesses that hold real customer relationships,

profit, know-how, and productive assets — not only subcontracted risk.

- Clear community safeguards around siting, traffic, dust, noise, emissions, and cumulative impacts.
- A reusable regional playbook that other New York regions and U.S. infrastructure communities

can adapt. What success is not A large number of projects, a large grant total, or a high recycling percentage by itself. Success is a portfolio of pathways whose technical, commercial, environmental, resilience, and distribution results remain positive after field evidence arrives.

15. The National Possibility: Syracuse as a Reference Implementation

A successful Syracuse demonstrator would not prove that every region should build the same glass plant, C&D hub, ownership structure, or industrial park. Geography, industry, waste, utilities, specifications, public institutions, and markets differ. The transferable product is the method. A national reference model would ask the same questions around every major infrastructure or industrial investment: What material and resource streams exist? Who owns them? Which have real disposal or supply-chain pain? What specifications and approval paths govern alternative uses? Which incumbent processors already solve the problem? Which customers can create demand? Which common infrastructure is missing? Who captures the margin, who carries the risk, and who bears local externalities? What should explicitly not be built?

Syracuse can therefore lead without claiming uniqueness. If it produces unusually transparent evidence about what worked, what failed, what was rejected, what the community gained, and which institutional arrangements reduced friction, it becomes a reference implementation other regions can adapt rather than a blueprint they must copy. National principle Replicate the method, evidence discipline, and market interfaces — not an identical set of plants.

PART III — HOW WE KEEP IT HONEST

The economic, technical, environmental, institutional, and community tests that prevent the vision from outrunning the evidence.

16. Economics: Separate the Business Case from the Public Case

Circular-economy proposals become misleading when every societal benefit is added to project revenue. A municipality may avoid disposal cost; a developer may reduce embodied carbon; a region may gain supply resilience. Those benefits matter only if they are measured, but they do not automatically become cash available to service debt. Every pathway should therefore carry two explicit ledgers and an attribution map showing who creates value and who can actually capture it contractually.

Enterprise ledger — who actually pays? Public / social ledger — who benefits? Gate or service fees Avoided disposal and landfill capacity Product sales Reduced virgin extraction / waste Testing / qualification services Emissions and water impacts Processing + logistics + residual costs Supply-chain resilience Debt service + maintenance + compliance Local wages, profit, ownership, and capability Contracted contribution margin Community/environmental burdens, including traffic, dust, noise, and siting impacts Financial discipline Social value may justify transparent policy support. It cannot be silently counted as business revenue. If the enterprise ledger fails, the pathway must be redesigned, explicitly supported for a documented public purpose, or rejected.

A second discipline is cash-flow attribution. If the municipality saves disposal cost but the processor cannot contract for part of that value, the saving does not finance the processor. If a buyer receives a carbon benefit but will not pay for it, that benefit is not enterprise revenue. Every proposed pathway should identify both value creation and value capture.

17. Scale, Logistics, and Incumbents: Build Only the Missing Node

The earlier “mini-mill everywhere” concept does not survive scrutiny. Material economics determine geographic scale. Concrete, C&D, heat, and water are highly local; electronics preparation and some materials processing can be regional; deep metallurgy may be multistate. The objective is not to maximize local machinery. It is to maximize economically durable regional participation and value retention.

Incumbent capacity is a feature, not an obstacle, when it already solves the problem. OCRRA’s existing contractors, KLAH, ready-mix producers, scrap processors, crushers, haulers, and other private operators should be treated as potential nodes in the system rather than displaced by default. A new asset is justified only if it closes an economically important gap better than tolling, contracting, or expanding existing alternatives.

Natural scale Default strategy At source / campus Avoid unnecessary movement; integrate closed-loop water, certain heat uses, or mobile processing only where nearby demand/load exists. Local / metro Collection, logistics, refurbishment, repair, and basic preparation create accessible supplier opportunities. Regional C&D processing, glass SCM, concrete, selected hubs can become demonstrator assets if throughput and contracts justify them.

State / multistate Use specialized deep refining or metallurgical hubs unless a proven regional bottleneck exists. Shared information layer Build reusable provenance, qualification, standards mapping, evidence, and market intelligence without requiring ownership of every plant.

18. Five Gates and Explicit Kill Criteria

Every candidate pathway advances only while the evidence remains acceptable across five independent gates: Technical: Does the material/process actually meet physical, chemical, safety, durability, and specification requirements? Commercial: Will real counterparties pay enough under realistic logistics, yield, compliance, and capital costs? Environmental: Does the lifecycle outcome remain better after transport, processing energy, durability, replacement, and residuals? Resilience: Can the business survive loss of a supplier, buyer, specification, subsidy, or commodity-price regime? Distribution: Who receives profit, ownership, productive assets, and decision rights — and who bears debt, externalities, and failure risk?

Kill / redesign trigger Why it matters Permanent operating subsidy is required for a mature process with no explicit public-purpose case. Circular branding should not hide weak unit economics. One supplier or buyer is irreplaceable and loss would cause default. Circular coupling can create fragility. Conservative lifecycle analysis shows no improvement after transport, treatment, and functional equivalence.

Recycled is not automatically environmentally better. Feedstock quality cannot be characterized or residual disposal is unresolved. Yield, compliance, and liability become unbounded. Local firms carry debt/compliance risk while high-value margin and equity remain centralized. The social thesis would be contradicted by the ownership structure. Community burdens are concentrated where benefits are not.

A circular project can still fail environmental-justice tests. The platform requires monopoly control or exclusive access to remain viable. Coordination should not become a new choke point. Speculative technologies are necessary to service project debt. Experimental modules must be additive, not existential.

Decision discipline Rejecting or deferring a pathway is a successful outcome when it prevents bad capital allocation, stranded assets, or unjustified community burdens.

18.1 Gates apply independently, with evidence confidence and a stopping rule

[V7 clarification / proposed controls] The five gates remain Technical, Commercial, Environmental, Resilience and Distribution. For every candidate, record a named evidence owner; primary source and date; what was measured versus assumed; sample representativeness; confidence; dependencies; red flags and the next cheap falsification test. A strong result on any one gate cannot offset a critical safety, compliance, environmental-justice or negative unit-economics failure elsewhere.

A standardized decision record should record Advance, Pilot/controlled trial, Research further, Redesign, Defer or Reject, with explicit authority and rationale. Do not present numerical scores as proven probabilities; uncertainty can be represented as ranges and scenarios until reliable data exist. Require independent reviews for material safety and permits, technical qualification, delivered economics, community effects and benefit allocation.

[Capital discipline] No permanent new asset is the default until existing options, recurrent feedstock rights, credible buyers, technical acceptance, permits, governance and downside financing are sufficiently evidenced. PPPs, OpCos and special-purpose vehicles are contingent delivery tools, not the reason to initiate a pathway.

19. Adversarial Test: What the Skeptics Are Right About

Skeptic / objection Required answer before advancing NYSDOT / engineer: “Do not introduce schedule, liability, quality, or specification risk.” Start with approved materials and existing specifications; use formal Materials Bureau processes; no experimental dependency on critical path. OCRRA / operator: “A waste stream is not free feedstock, and we already have contracts/outlets.” Map ownership, current cost/revenue, contamination, existing obligations, and incremental value of changing the outlet.

Incumbent recycler / producer: “You are duplicating capacity or taking feedstock without understanding my economics.” Use existing capacity first; build only where a documented market failure or bottleneck remains. City / budget official: “Why should taxpayers finance a speculative industrial scheme?” Phase 0 is feasibility work; no major permanent capital before contracts and evidence; public support tied to explicit public value.

Community advocate: “Do not put truck traffic, dust, noise, or industrial risk into already-burdened neighborhoods and call it equity.” Measure cumulative impacts, involve affected neighborhoods early, and make siting/environmental safeguards a gate. Investor / lender: “Where are contracted feedstock, offtake, margins, and downside coverage?” No debt case relies on speculative loops; demonstrate contracted contribution margin, diversification, contingency, and residual outlets.

Industry skeptic: “If this makes money, why do you need a public initiative?” Public role is to reduce information, standards, permitting, coordination, and common-infrastructure friction — not to replace commercial decisions. National-policy skeptic: “Industrial symbiosis Replicate the method for identifying and already exists; what is actually replicable?” governing loops, not an identical Syracuse plant configuration.

20. Governance, Procurement, Data, and Community Safeguards

The correct early governance model is “use existing institutions first.” The City, OCRRA, NYSDOT, processors, producers, economic-development organizations, buyers, and affected communities already have distinct authorities. Phase 0 should clarify those authorities rather than create a new entity before an institutional

gap is proven. Much of the system should remain industry-led. The public role is narrow but important: convene where fragmentation blocks action; publish non-sensitive data; maintain procurement integrity; clarify standards and approval routes; invest in common infrastructure only where a documented public case exists; prevent monopoly control of shared access; and ensure local environmental burdens and ownership outcomes are visible.

Guardrail Implication No procurement steering Public agencies do not promise awards or preference outside lawful procurement and approved-material processes. No bid-sensitive data sharing The material ledger begins with public/aggregated data; confidential information is shared only under appropriate agreements. No one-body approval fiction NYSDOT retains material/specification authority; OCRRA retains waste-system obligations; private firms retain commercial decisions.

Open participation The regional model should be interoperable and nonexclusive; it should not require one private platform to control market access. Community participation before siting Affected neighborhoods help define acceptable impacts, benefits, and safeguards before permanent facilities are proposed. Existing processor first A new asset must demonstrate why tolling, contracting, or expanding an incumbent is inferior.

Portable evidence Qualification/provenance records should remain usable across counterparties rather than trapped inside one vendor platform. Independent measurement Program success is judged by predeclared technical, commercial, environmental, resilience, and local-value metrics — not press coverage. This governance philosophy reflects a lesson from industrial-symbiosis research: successful exchanges often emerge through bilateral commercial relationships supported by enabling institutions rather than through a central planner dictating every exchange. [13][14]

PART IV — HOW WE BEGIN

A bounded decision sprint, explicit metrics, a credible Syracuse coalition, and a low-friction first institutional ask.

21. The 90-Day Phase 0 Demonstrator

Phase 0 is a decision sprint, not a promise of full qualification or commercialization in 90 days. Full material qualification, environmental review, contracting, or permitting may take longer. The purpose is to produce enough evidence to choose the correct next state. The sprint should focus first on glass and I-81/C&D while also establishing the reusable evidence, qualification, economic, governance, and local-value framework that future pathways would use.

By Day 90 Minimum artifact Regional material baseline Ownership, quantity, quality/variability, current destination, data limitations, and existing contracts/outlets for candidate streams. Glass pathway dossier Source terms, processor acceptance/capacity, freight, yield, residuals, product specification, candidate buyer, preliminary economics. C&D characterization plan/results Representative sampling, composition, recoverable fractions, current destinations, and specification map.

Specification / approval map Existing NYSDOT/City pathways, additional testing required, responsible authority, and estimated timeline. Preliminary TEA + LCA screen Enterprise cash economics separated from public value; conservative transport and functional-equivalence assumptions. Market-formation map Counterparties, missing contracts, financing conditions, liability/warranty questions, data gaps, and first-mover risks.

Stakeholder / community risk map Siting, traffic, emissions, labor/ownership, procurement, confidentiality, and institutional dependencies. Decision dossier Commercial development / controlled pilot / R&D / redesign / reject — with explicit reasons and remaining conditions. Phase 0 capital rule No permanent processing asset should be purchased because a presentation says it will have feedstock. Equipment, land, and project debt come after real material characterization and real counterparties.

21.1 An outcome-led roadmap: three phases, then a decision

[V7 reconciliation / proposed planning window] The website now leads with the outcome rather than the duration: 'Know what is worth doing next.' The 90 days are an illustrative timebox for a decision-ready opportunity portfolio, not a schedule for facility procurement. Days 1-30 (Explore and prioritize) produce an attributed regional source-and-demand inventory and shortlist, including alternatives already served by incumbents. Days 31-60 (Validate and deepen) develop initial pathway dossiers with counterparties, standards, sampling plans, costs, risk and confidence. Days 61-90 (Plan and enable) document delivery options, owners, procurement constraints, follow-on tests and costs.

The proposed handoff contains three products: a prioritized opportunity inventory, preliminary business-case dossiers and a delivery-options/next-step plan. A leadership decision is subsequent, not a fourth automatic construction phase. The correct result can be Advance, Validate further, Defer or Stop. The 'win' is an evidence-backed choice that prevents poor investments and makes justified ones easier. The three-phase schedule is contingent on access to data and partners; full qualifications, public approvals and contracts may take longer.

22. Metrics: What Would Count as Success?

A demonstrator should be judged on evidence, not press coverage. The baseline metrics should be set before the first pilot so unsuccessful pathways remain visible rather than explained away after the fact. Category Illustrative metrics Material Tons characterized; usable yield; contamination; residual fraction; provenance completeness; data confidence.

Commercial \$ / ton current disposition; delivered product cost; processor margin; buyer savings/premium; contracted volume; customer concentration. Technical Applicable specification; test results; field acceptance; quality variability; failure/reject rate; warranty/liability disposition. Environmental Functional-unit LCA; transport miles; virgin material displaced; landfill avoided; local burdens and residuals.

Resilience Number of qualified suppliers/buyers; substitution options; inventory/buffer needs; single-point dependencies. Local value Local payroll; repeat supplier spend; local profit; ownership; productive assets; certifications/capability retained. Market formation Time/cost to qualify; number of missing data elements closed; contracts created; counterparties linked; transaction friction reduced.

Governance Data-sharing compliance; community participation; procurement integrity; time to decision; conflicts or grievances resolved.

22.1 Scorecard design and falsification

[V7 proposal] Program-level activity counts (meetings held, slide decks, attendees or dollars requested) are not success measures. Report separately: (A) evidence completeness and uncertainties closed, (B) pathway technical/commercial/environmental qualification, (C) mobility, ownership and distributed value, and (D) capital risk and community burdens avoided. Use initial baselines and predeclared thresholds once stakeholders and data owners agree; no fabricated job, GHG or ROI forecast belongs in a publication-ready scorecard.

For material flows use actual tons sampled, representative usable yield, contaminants and rejected residuals. For markets use fully delivered cost by actor, payment terms, buyer adoption, substitute price, processing energy, freight, warranty and concentration. For environmental outcomes use a common functional unit, sensitivity to haul distance, useful life and disposal counterfactual; distinguish carbon, water, toxicological and nuisance dimensions. For community outcomes report neighborhood-specific exposure, consultation and grievance follow-through. Every outcome needs an evidence owner and update interval.

A failed pathway with a sound decision record is a valid Phase 0 outcome. An implausibly positive score assembled from unverified claims is not.

23. Why Syracuse Is a Credible Proof Point

The case for Syracuse should be ambitious without pretending uniqueness has been proven. The argument is that the region has an unusually strong combination of conditions at one time. Syracuse is large enough to have sophisticated engineering, universities, public agencies, processors, logistics, major public works, and advanced-manufacturing demand — but small enough that the relevant institutions can plausibly convene around a common material-flow problem. That is a hypothesis worth testing, not a guarantee of success.

Demonstrator requirement Central New York condition Large, durable demand I-81, Micron-related growth, public works, supplier facilities, utilities, and private development. Visible material problems OCRRA glass-market friction; mixed C&D; future industrial material streams. Existing specifications / approval routes NYSDOT recycled-material uses and approved supplementary cementitious materials.

Policy signal New York Buy Clean / EPD requirements and tighter concrete GWP limits scheduled for 2027. Existing processors / producers Regional concrete, recycling, hauling, and material-processing firms already operate here. Institutional proximity City, County, NYSDOT, OCRRA, CenterState, universities, industry, and community organizations are regionally accessible.

Long time horizon Micron describes a 20+ year buildout; I-81 Phase Two is underway now. Explicit civic objective City policy already emphasizes shared community wealth, supplier opportunity, and generational wealth.

24. Why Each Institution Might Care

The initiative becomes durable only if participants have reasons to engage that are compatible with their existing missions. The following are hypotheses to test, not promises of benefit. Institution / stakeholder Potential value if the pathways survive scrutiny City of Syracuse Durable supplier base, neighborhood economic opportunity, better use of infrastructure investment, measurable local-value outcomes.

Onondaga County Regional industrial capacity, resource efficiency, stronger supplier ecosystem, infrastructure utilization, economic growth. OCRRA Higher-value outlets, reduced disposal exposure, evidence about material markets, diversified downstream options. NYSDOT / public owners Additional qualified supply options, better evidence, Buy Clean pathways, transparent reuse data without schedule/specification compromise.

Processors / manufacturers New feedstock and customer relationships, lower market-development friction, better qualification evidence. Micron / major private buyers Resilient local suppliers, future lower-carbon material options, measurable community/supplier development, infrastructure synergies. Local businesses / workers Repeat contracts, skill formation, profit, ownership opportunities, asset formation, pathways into higher-value scopes.

Communities Transparent burden/benefit analysis, earlier siting voice, measurable ownership and local-value commitments, stronger environmental safeguards. Universities / labs Applied research, student/faculty projects, material characterization, field validation, economic and policy research. Capital providers Better feedstock/offtake evidence, clearer risk allocation, modular SPV opportunities, reduced market uncertainty.

25. The First Table and Call to Action

The next institutional step should be a small scoping table, not a new authority. Its purpose is to test whether the first two loops warrant Phase 0, identify what is already being done, identify the correct technical and commercial owners, and determine what public/non-confidential information can be assembled without disrupting active procurement.

A first table could include the City/I-81 office, OCRRA technical leadership, NYSDOT materials/project representation, an appropriate processor/ready-mix/contractor perspective, economic-development leadership, community/neighborhood representation, and a workforce/training perspective such as Syracuse Build/ON-RAMP or an appropriate apprenticeship/training intermediary. The purpose is not to preselect winners; it is to identify who owns each question and what evidence is required next.

Participant Question they should help answer City / I-81 office What material/demand windows remain open, what existing initiatives overlap, and who should be involved next? OCRRA technical leadership What streams create unresolved market pain, who owns them, what contracts/outlets exist, and what data are reliable? NYSDOT / materials functions Which existing specifications and approval routes apply, and what would require additional testing? Processor / ready-mix / contractor What can actually be processed, sold, scheduled, warranted, and delivered? Economic development What supplier, capital, workforce, and site barriers prevent viable local participation?

Community / neighborhood representation What benefits and burdens must be measured before siting or expansion? Initial ask No funding commitment. No procurement commitment. No specification change. No endorsement of a national program. The first ask is simply: Is there enough here to justify a disciplined 90-day Phase 0 — and if so, who should own each workstream? Is this opportunity real — and if it is, how should Syracuse begin?

25.1 Participation, information custody and publication boundaries

[V7 practical follow-on / proposed operating protocol] The website invites ideas, evidence, opportunity suggestions, pathway review and community input. A public intake channel and accountable publisher have not been validated by the present source set. Accordingly, downloadable templates or copied drafts must not be described as submissions. The first convening should identify who receives input, permissions and data-retention policy; who can see commercially confidential or personal information; what may be published; and a mechanism to return status without disclosing protected information.

Every participant should be able to challenge an assumption, correct a source, propose a competing outlet, or identify an inequitable risk allocation. Contributed material does not become 'documented fact' merely upon receipt. State the author, verification method, independent sources, restrictions and change history before promoting a claim.

APPENDIX A — Source verification and unresolved facts

The numbered citations [1]–[27] below are inherited from Working Paper 6.0. The new primary-source cross-checks [28]–[37] are editorial additions (retrieved in October 2026), not new counterparties. “Confirmed”

means the linked page supports the limited statement in this edition, not that approvals or project economics are current at contracting time.

ID	SOURCE	URL
[28]	City of Syracuse, recycled-glass sidewalk pilot, September 4, 2024	https://www.syr.gov/News/2024/2024-09-04-Infrastructure-News-345-PM
[29]	NYSDOT approved mineral admixtures, §711-15	https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/170-1b.html
[30]	NYSDOT recycled materials approved for earthwork §733-19	https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/rec_mat.html
[31]	Syracuse Build, City of Syracuse	https://www.syr.gov/Government/Mayors-of-Syracuse/54th-Mayor-Ben-Walsh/Mayor-Walsh-Major-Initiatives/Syracuse-Build
[32]	Empire State Development ON-RAMP program	https://esd.ny.gov/on-ramp
[33]	NYSDOT July 3, 2026 I-81 Phase Two Contract 6 release	https://www.dot.ny.gov/news/press-releases/2026/2026-07-031
[34]	Micron July 9, 2026 Clay construction announcement	https://investors.micron.com/news/press-release/2026/Micron-Accelerates-U-S--Investments-Pours-First-Concrete-at-New-York-Fab/default.aspx
[35]	New York OGS Executive Order 22 embodied-carbon guidance	https://ogs.ny.gov/eo-22-embodied-carbon-guidance-faqs
[36]	Micron New York employment and expansion page	https://www.micron.com/content/micron/us/en/manufacturing-expansion/ny.html
[37]	OCRRA 2025 annual recycling report (revised)	https://ocrra.org/wp-content/uploads/2026/04/OCRRA_2025_AnnualReportRecyclables_REVISED_030926.pdf

[28] City of Syracuse, recycled-glass sidewalk pilot, September 4, 2024 | CONFIRMED. City reports 20% cement replacement and no additional cost in pilot; not a universal mix approval. | <https://www.syr.gov/News/2024/2024-09-04-Infrastructure-News-345-PM>

[29] NYSDOT approved mineral admixtures, \$711-15 | CONFIRMED/RECHECK. Pantheon KLAW listed in retrieved schedule; approval status should be checked at procurement. | <https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/170-1b.html>

[30] NYSDOT recycled materials approved for earthwork \$733-19 | CONFIRMED/RECHECK. RCA allowed for specified subbase and embankment uses, subject to technical provisions. | https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/pages/rec_mat.html

[31] Syracuse Build, City of Syracuse | CONFIRMED. Existing construction workforce pathways; does not imply partnership. | <https://www.syr.gov/Government/Mayors-of-Syracuse/54th-Mayor-Ben-Walsh/Mayor-Walsh-Major-Initiatives/Syracuse-Build>

[32] Empire State Development ON-RAMP program | CONFIRMED. Flagship regional advanced-manufacturing workforce center; no Circular CNY formal affiliation established. | <https://esd.ny.gov/on-ramp>

[33] NYSDOT July 3, 2026 I-81 Phase Two Contract 6 release | CONFIRMED. Contract 6 announced at \$2.1 billion; not fungible discretionary Circular CNY funding. | <https://www.dot.ny.gov/news/press-releases/2026/2026-07-031>

[34] Micron July 9, 2026 Clay construction announcement | CONFIRMED. First concrete / vertical construction; projected activity is not Circular CNY committed offtake. | <https://investors.micron.com/news/press-release/2026/Micron-Accelerates-U-S--Investments-Pours-First-Concrete-at-New-York-Fab/default.aspx>

[35] New York OGS Executive Order 22 embodied-carbon guidance | CONFIRMED/RECHECK. Concrete guidance and later GWP limits; project-specific applicability needs checking. | <https://ogs.ny.gov/eo-22-embodied-carbon-guidance-faqs>

[36] Micron New York employment and expansion page | PROJECTED. Jobs are employer projections across long horizon, not Circular CNY outcomes. | <https://www.micron.com/content/micron/us/en/manufacturing-expansion/ny.html>

[37] OCRRA 2025 annual recycling report (revised) | SOURCE AVAILABLE / PARTIAL. Specific glass/C&D table values require row-level confirmation and voluntary-data limits. | https://ocrra.org/wp-content/uploads/2026/04/OCRRA_2025_AnnualReportRecyclables_REVISED_030926.pdf

Original Version 6 source notes

Sources are retained from Working Paper 4.0 and are used to distinguish current public facts, existing specifications, vendor claims, and broader research. Vendor claims remain identified as such; Phase 0 should independently validate any figure that affects commercial decisions. [1] OCRRA, “2025 Annual Report on Recyclables Recovered & Updated Comprehensive Recycling Analysis,” Feb. 27, 2026. Includes 82,016 tons of C&D received, 5,564 tons of glass reported recycled, glass disposal/beneficial-use information, and explicit limitations that much commercial recycling data is voluntarily reported and unaudited. Source [2] City of Syracuse, Community Grid Vision Plan (2024). Includes goals concerning citizen-developers, economic inclusivity, shared community wealth, access to jobs, and financial security.

Source [3] City of Syracuse, Mayor Sharon F. Owens, 2026 State of the City Speech. Source [4] New York State Department of Transportation, July 3, 2026, Phase Two / Contract 6 announcement for the I-81 Viaduct Project. Source [5] NYSDOT Technical Services, Recycled Materials Approved for Use as Earthwork Material (733- 19), including recycled Portland cement concrete aggregate uses. Source [6] NYSDOT Technical Services, Concrete Mineral Admixtures Approved List, listing Pantheon / KLAW Industries under §711-15. Source [7] NYSDOT Standard Specifications §711-15, Miscellaneous Supplementary Cementitious Materials (2026). Source [8] New York State Office of General Services, EO 22 Embodied Carbon Guidance FAQs, including mandatory concrete GWP/EPD requirements and 2027 tightening. Source [9] City of Syracuse, “City of Syracuse Tests Lowering the Carbon Footprint of Its Sidewalks,” Sept.

4, 2024. Reports 20% glass cement replacement and no additional cost in the City pilot. Source [10] KLAW Industries, recycler/process materials pages. Vendor-reported claims regarding contaminated MRF glass and modular processing; requires independent diligence for commercial underwriting. Source [11] Micron, “Micron Accelerates U.S. Investments, Pours First Concrete at New York Fab,” July 9, 2026. Source [12] Micron, New York expansion / community investment materials. Source [13] Marian R. Chertow, “Industrial Symbiosis: Literature and Taxonomy,” *Annual Review of Energy and the Environment* 25 (2000). Source [14] “Re-constructing Kalundborg: the reality of bilateral symbiosis and other insights,” *Journal of Cleaner Production* (2016). Source [15] Ranasinghe, Domingo & Kahandawa, “Enhancing building material circularity: A systematic review on prerequisites, obstacles and the critical role of data traceability,” *Journal of Building Engineering* 98 (2024). Source [16] “From research to practice: A review on technologies for addressing the information gap for building material reuse in circular construction,” *Sustainable Production and Consumption* 45 (2024). Source [17] “Comparative life cycle assessment of natural and recycled aggregate concrete: A review,” *Science of the Total Environment* 950 (2024). Source [18] Hewage et al., “An ISO-Informed Methodological Audit of Life Cycle Assessment Practices in Recycled Aggregate Concrete,” *Circular Economy and Sustainability* (2026). Source [19] Buchele, Kruse, Rodgers & Scharf, “Show Me the Money: Does Shared Capitalism Share the Wealth?” NBER Working Paper 14830 (2009). Source [20] Blasi, Kruse & Markowitz, “Risk and Lack of Diversification under Employee Ownership and Shared Capitalism,” NBER Working Paper 14229 (2008). Source [21] Lowe et al., “Methods to estimate the circular economy rebound effect: A review,” *Journal of Cleaner Production* 443 (2024). Source [22] Federal Reserve Bank of Cleveland, “Wealth Building: Keeping It Local” (2014), discussing anchor-institution approaches and local wealth retention. Source [23] Brookings Metro, Joseph W. Kane and Megan Wright, “The AI durability of built environment careers,” Mar. 12, 2026. Reports that 83.6% of 17.3 million workers in 148 built-environment occupations were in occupations with below-average measured AI exposure and 73.8% in occupations with above-average measured AI complementarity.

<https://www.brookings.edu/articles/the-ai-durability-of-built-environment-careers/> [24] City of Syracuse, “Syracuse Build.” Describes an inclusive skilled-infrastructure workforce pipeline, Pathways to Apprenticeship, Build Ready, HVAC/R and related construction-career preparation.

<https://www.syr.gov/Government/Mayors-of-Syracuse/54th-Mayor-Ben-Walsh/Mayor-Walsh-Major-Initiatives/Syracuse-Build> [25] Empire State Development, “ON-RAMP.” Describes a flagship Central New York advanced-manufacturing workforce training center in Syracuse and consortium-based training/support infrastructure. <https://esd.ny.gov/on-ramp> [26] Micron, New York expansion materials. Projects 9,000 Micron jobs, 4,500 construction jobs and 40,000 indirect jobs over the New York buildout.

<https://www.micron.com/us-expansion/ny> [27] Micron, New York careers / Registered Apprenticeship Program and 2026 construction announcements. Supports paid apprenticeship, skilled-trade, local supplier, and construction-career pathways around the Clay project. <https://www.micron.com/about/careers/new-york> and <https://investors.micron.com/news/press-release/2026/Micron-Selects-Bechtel-as-Construction-Partner->

for-Historic-New-York-Semiconductor-Project/default.aspx Public / confidential boundary This public paper intentionally describes the civic, commercial, market-design, and institutional architecture at a high level. It does not disclose proprietary technical methods, unpublished formulations, feedstock-scoring logic, process windows, calibration data, optimization algorithms, source code, or counterparty-confidential economics.

APPENDIX B — Revision and reconciliation register

ID	AREA	CHANGE	TRACE
R01	Executive summary	Re-centered on decision-ready portfolio and explicit evidence states	V6 executive + Roadmap / Working Paper pages
R02	Second Dividend	Separated project, market and distribution results	V6 ch.2 + Vision
R03	Model	Documented five-stage source-to-market method	V6 ch.5 + Model
R04	First pathways	Glass and RCA remain first material tests; no assumed customers	V6 ch.7 + Glass/RCA
R05	Portfolio	Nine screening families, no implied facility approval	V6 ch.8 + Opportunity Portfolio
R06	Feedstocks	Source networks and aggregation service before new site	V6 ch.10 + Feedstocks
R07	Reclaimed water	Separated from first material pathways; qualified uses only	V6 ch.11 + Reclaimed Water
R08	Workforce	Added accountable roles, mobility and ownership measurements	V6 ch.13 + Jobs & Mobility
R09	Gates	Made kill/review/authority criteria explicit	V6 ch.18 + Model
R10	90-day scoping	Defined three outputs and post-sprint decision	V6 ch.21 + Roadmap
R11	Metrics	Required baselines, counterfactuals and negative outcomes	V6 ch.22

R12	Participation	No fictitious intake or authorization	V6 ch.25 + Participate
R13	Primary sources	Verified selected claims; separated projections	V6 citations + new sources [28]-[37]
R14	Publication control	Versioned, non-confidential, subject to legal/rights/fact approval	All

APPENDIX C — Decision-critical information still missing

WORKSTREAM	EVIDENCE TO SECURE
Glass	Legal owner and transfer rights; sampling representativeness; processor input limits, price and rejection rates; offtake and warranty terms.
RCA	C&D source composition and separation; certified applications by job; haul constraints; stockpile approvals; buyer purchase commitment.
Water	Permits and legal supply; water chemistry and seasonality; appropriate quality class; named user and uptime requirements; full treatment/piping economics.
Feedstocks	Supplier permissions, quantities and timing; contamination controls; current markets; collection density; alternate processors and residual routes.
Employment/ownership	Employer demand and wage baselines; training-owner agreements; safety; ownership upside versus leveraged risk.
Governance	Convening sponsor, publisher and public contact; data custody, community participation, procurement boundaries and conflict policy.
Capital	Investor/owner risk allocation, downside underwriting, useful asset life and realistic alternatives to greenfield buildout.
Environmental	Functional unit, full cradle-to-application burden, local emissions/water/traffic/noise impacts, substitutes and counterfactuals.

Publication and authorship boundary

This working paper is a review-stage editorial synthesis built from recovered Version 6.0 text and 18 public-facing prototype pages, plus limited primary-source checks dated October 2026. Inherited citations and quantitative claims must be checked line-by-line against their originals before public release; participants

and agencies have not endorsed its proposals. All implementation decisions remain subject to laws, formal procurement, engineering qualification, environmental approvals and informed community processes.

Editorial release and validation checklist

The following items must be closed before this candidate draft is presented as an authorized public publication. Inclusion in a downloadable staging website does not satisfy them.

GATE	STATUS	WHAT MUST BE SHOWN
Editorial ownership	PENDING	Original author confirms the revised argument and all substantive added sections.
Quantitative claim audit	PENDING	Check inherited [1]-[27] reference numbers, report rows and full source context, not merely source titles.
Technical / regulatory	PENDING	Independent specialists verify specification status, materials claims, wastewater conditions and relevant laws.
Rights / confidentiality	PENDING	Review third-party images, source reproduction, proprietary exclusions and consent/privacy language.
Publisher / public contact	PENDING	Identify the publishing entity, actual contact route and change-record custodian.
Controlled release	PENDING	Approve a final PDF hash and matching HTML download, then remove staging-only search blocks if appropriate.

Revision trace: see the companion CNY_WP7_CHANGE_REGISTER.csv, CNY_WP7_VERIFICATION_REGISTER.csv and CNY_WP7_UNRESOLVED_ISSUES.csv distributed with this candidate. These are part of the editorial evidence trail.