AA1000 Standards in the Circular Economy and Recycled materials

This course is developed in the context of TÜV AUSTRIA's collaboration with AccountAbility, applying AA1000 principles to circular economy claims

Thursday, March 19, 2026

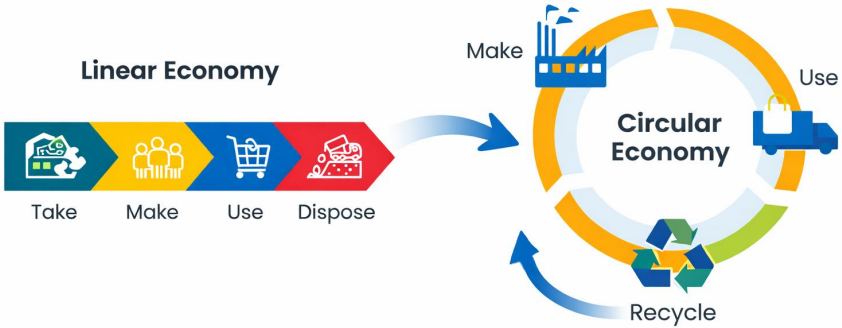
Topics

1. Circular economy & why recycled materials matter
2. Recycled materials & Traceability models
3. Evidence expectations through an AA1000 lens
4. Standards & Certification and common issues

Ask Me Anything: making recycled-content claims assurance-ready (traceability × governance × impact)

From Linear to Circular: A New Value Creation Model

A systemic shift in how value is created, preserved, and measured across global supply chains



✓ **Systemic transition**: moving beyond the “take–make–waste” model toward a restorative circular economy

✓ **Not only environmental:** it’s a fundamental economic shift in value creation and retention

✓ **Decouple growth from resource use**: keep materials in use longer, maintain value across lifecycles, design out waste

✓ **Design is the lever**: durability, reparability, and high-quality recyclability become product requirements

AA1000 lens: where claims, evidence and stakeholder trust meet

Plastics & Recycled Content: The Practical Lever for Circularity

- ✓ Ubiquitous across value chains
- ✓ End-of-life management is complex and often leaky
- ✓ **System risk**: waste & pollution → policy & reputation pressure

Why plastics are “unique”?

Why recycled plastics matter

- ✓ Displace virgin fossil-based feedstocks
- ✓ Reduce carbon intensity in packaging & durable goods
- ✓ Enable circularity through better design and traceability

Next: What’s driving recycled content adoption?

What's Driving Recycled Content Adoption—and What It Means for Accountability

	Key Factors	Accountability Implications
 **Regulatory compliance**	• EU Packaging & Packaging Waste Regulation (PPWR) • National measures (e.g., Spain plastic tax)	• Minimum recycled content targets become mandatory • Financial penalties for non-compliance
 **Market Demand**	• Brand commitments for 2025/2030 • Retailer supply chain requirements	• High demand for certified PCR content • Market premium for credible recycled content
 **Climate Pressure**	• Scope 3 focus in value chain emissions • SBTi expectations	• Recycled materials recognized as a lever to reduce upstream emissions • More scrutiny on methodology & data quality
 **Consumer Transparancy**	• Green Claims rules: restrictions on generic "eco-friendly" terms Implications	• Third-party verification becomes essential • Prevent greenwashing and protect brand trust

Technical Taxonomy of Recycled Plastic Materials

Feedstock origin matters: PIR vs PCR determines typical quality, risk profile, and assurance evidence. [ISO 14021 definitions]

Pre-Consumer

Definition
- Diverted during manufacturing; never reached end user
- Includes scrap, offcuts, rejected parts
- **Excludes in-process re-use without modification** ("process efficiency", not recycling)

Typical profile
- Cleaner, more consistent; easier to reprocess

Assurance focus
- Prove PIR origin (manufacturing scrap) & traceability to source process
- Check not internal regrind loop (same-process reuse)

Post-Consumer

Definition
- From products that reached intended end users; no longer used for original purpose

Typical profile
- More contamination & polymer mix risk (labels, residues, adhesives)

Assurance focus
- Stronger evidence on collection/sorting, contamination control, yield & loss
- Higher "waste diversion" claim strength

Reminder: Feedstock origin (PIR/PCR) is different from reprocessing method (mechanical/chemical).

Technical Taxonomy of Recycled Plastic Materials

Reprocessing method shapes resin properties, application range, and claim integrity.

Mechanical Recycling

What it is
- Sorting → washing → shredding → melting (physical)
- Polymer chemistry unchanged

Strengths
- Mature, scalable; typically lower energy/carbon

Limitations
- Downcycling risk: chain degradation over repeated cycles
- Sensitive to contamination & polymer mixes

Assurance focus
- Input quality controls + process controls + output specs
- Evidence of yield, reject rates, and quality consistency

Chemical Recycling

What it is
- Depolymerizes to monomers/base chemicals
- Can produce virgin-quality outputs

Strengths
- Handles complex/multi-layer/contaminated streams
- Potential route to food-grade applications (key bottleneck for mechanical)

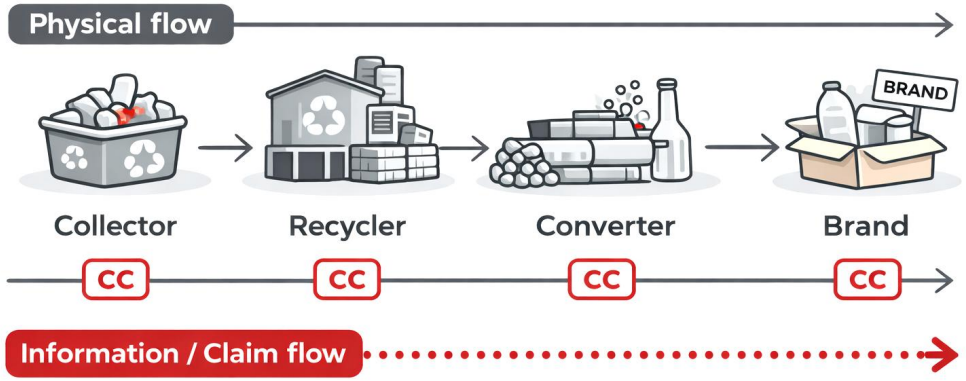
Trade-offs / debate
- High cost & CAPEX; environmental benefit debated
- Mass balance accounting is a critical assurance hotspot

Assurance focus
- Define system boundary + allocation rules
- Verify chain-of-custody model and claims wording (especially mass balance)

For assurance, separate “origin” (PIR/PCR) from “process” (mechanical/chemical), then test whether the claim fits the evidence.

Traceability Models & Chain of Custody (ISO 22095)

CoC makes sustainability claims auditable by linking physical flow and information flow across custody changes.



cc = change of custody

01

Physical flow moves forward; information flow must follow and reconcile at every custody change

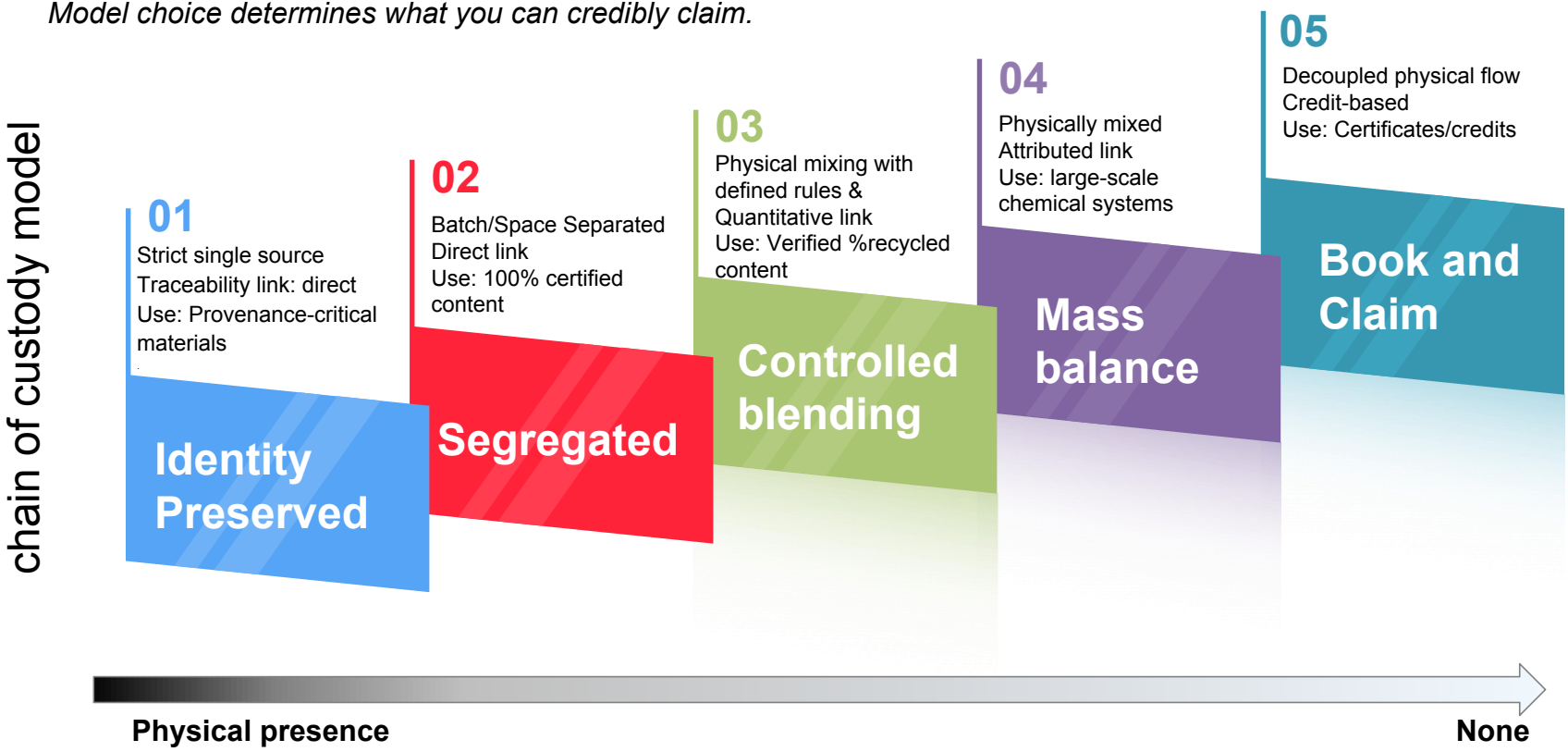
02

What auditors test

- Controls (segregation / mixing rules)
- Reconciliation (input-output balance, losses)
- Claim wording (what is promised vs what is evidenced)

ISO 22095 CoC Models: From Physical Certainty to Bookkeeping

Model choice determines what you can credibly claim.



Models without Mixing: Identity Preserved vs Segregated

01

Identity Preserved (IP)

- Rule: single source, identity maintained
- Strength: strongest provenance claim
- Typical audit focus: identity controls + documentation continuity

one source, same identity

02

Segregated

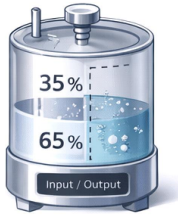
- Rule: certified separated from non-certified throughout chain
- Strength: physical presence is indisputable (100% certified material)
- Typical audit focus: storage/labeling + segregation controls + batch records

many certified sources, but always separated with non-certified

Models with Mixing: Controlled Blending vs Mass Balance

03

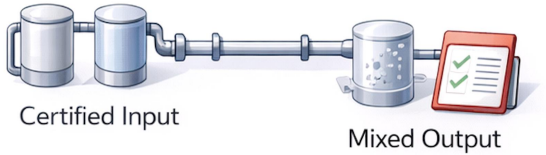
Controlled Blending



- Physical rule: planned mixing regime
- Bookkeeping: quantitative (% verifiable)
- Typical: mechanical recycling; performance tuning
- Assurance focus: recipe control + input/output reconciliation + loss factors

04

Mass Balance



- Physical rule: certified & non-certified physically mixed
- Bookkeeping: attributed allocation
- Typical: chemical production where segregation impractical
- Assurance focus: allocation method & conversion losses & claim communication

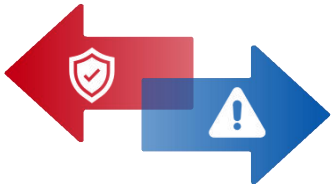
Controlled blending answers “% physically in product”

mass balance answers “attribute allocated to output”

Mass Balance: Value, Controversy, and Claim Integrity

Why it's used

- Enables transition at scale (no parallel lines)
- Works for complex/contaminated streams
- Supports investment ramp-up



Why it's criticized

- Allocation methods can decouple physical flow from perceived claim
- Risk of consumer misunderstanding / greenwashing accusations
- Transparency depends on rules / wording / verification

Claim wording controls

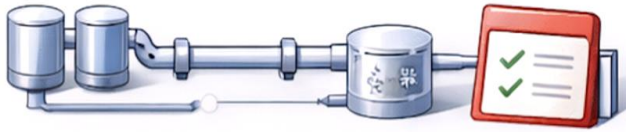
- **Do**: say "mass-balance attributed recycled content" where applicable
- **Don't**: imply physical presence if it's attributed
- **Do:** disclose certification scheme + allocation approach in B2B docs

Mini decision logic

Can you physically separate?
- IP / Segregated

→ Mixing with measurable recipe? → Controlled blending

→ Mixing unavoidable? → Mass balance



From CoC Models to Assurance: Why Governance Matters

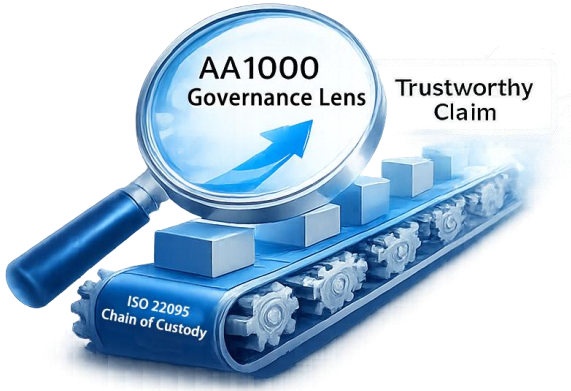
What AA1000 adds (governance layer)

- Principles & process to test: materiality, evidence quality, and claim integrity
- A structured way to conclude “is this claim trustworthy?”

AccountAbility

What we established (technical layer)

- CoC links physical flow ↔ claim flow
- Model choice defines claim type (physical vs attributed)
- Main risks: reconciliation gaps + misleading wording

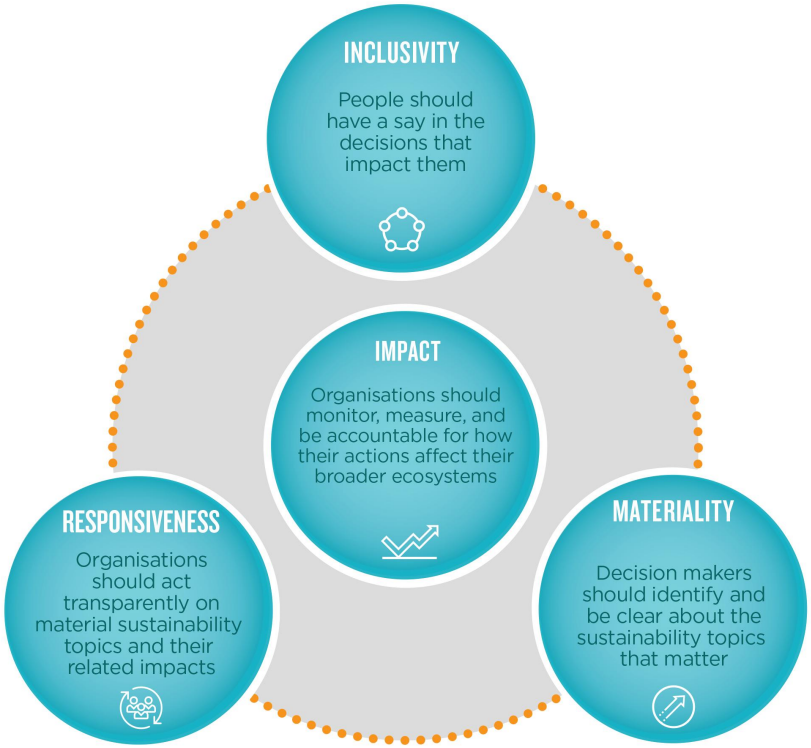


AA1000 as the Governance Layer for Circular Economy Claims

CoC tells us what can be claimed. AA1000 tells us whether the claim is trustworthy.

- Assurance methodology to validate circular economy disclosures
- AA1000AS v3 evaluates adherence to 4 principles
- Focus: integrity, transparency, decision-useful sustainability disclosures

AA1000AS v3: Four Principles for Claim Integrity



Source: AccountAbility, AA1000AS v3 principles.

Applied to claims: recycled content / CoC model / evidence

Principles: Inclusivity & Materiality

Good claims start with the right stakeholders—and the topics that matter to decisions.

Inclusivity (Stakeholder reality check)

Who to engage

- Collectors / aggregators / recyclers
- Brands / retailers & key customers (claim users)
- Affected communities, workers, and consumers

What to evidence (reality check)

- Stakeholder mapping: *who is affected and how?*
- Engagement channels: *interviews, audits, complaints, supplier feedback*

Inclusivity: “Who is affected—and did they all have a say?”

Materiality (Topics that matter to decisions)

What must be right (examples)

- PCR proportion & method & boundary *(standard, period, site, mass-balance rules etc)*
- CoC model clarity *(physical vs attributed; what the claim does and does not mean)*
- Quality / Risk factors *(contamination, chemical safety / hazard risks)*
- End outcome relevance *(recyclability / closed-loop feasibility; key limitations & uncertainty)*

How it shapes the claim

- Use stakeholder input to refine the claim scope, risks, and disclosures (incl. limitations)

Materiality: “What would change decisions if wrong?”

Principles: Responsiveness & Impact

Transparency is performance over time—impact is the outcome in the real world.

Responsiveness

Targets → results → disclosure discipline

- Example: “30% PCR in all primary packaging by 2025”
- Report progress with method, boundary, and deviations explained
- Claims must be accurate and substantiated

Inclusivity: “Who is affected—and were they heard?”

Impact

Outcomes beyond content numbers

- Tons diverted from landfill/ocean
- Water savings in washing
- Lifecycle GHG reduction

Materiality: “What would change decisions if wrong?”

AA1000 Assurance Interface: From CoC Data to Disclosure Quality

Type & Level

Two engagement types: Type 1 vs Type 2

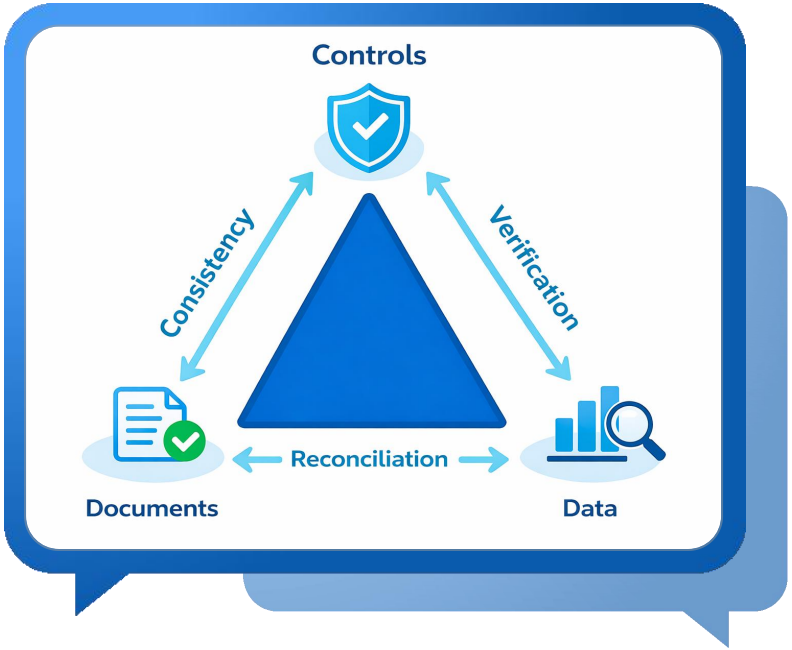
- Type 1: evaluates adherence to the four AA1000 AccountAbility Principles (process-level)
- Type 2: evaluates Principles and the reliability/quality of specified sustainability performance information (data-level)

Two assurance levels: Moderate vs High

- **For recycled materials claims, Type 2 is typically more relevant**
  - recycled content / CoC claims depend on specified performance data (e.g., PCR %, mass-balance reconciliation, yield/loss, boundary & period), not only on governance/process design

- **AA1000AS v3 takes a broad, integrated and forward-looking view**
  - links management systems & controls to disclosure credibility (not just checking single numbers)

Evidence Building Blocks: Documents & Data & Controls



No controls, data becomes "stories".

Control: calibration control, segregation checks, sampling, internal review

Numbers that reconcile: input, output, yield, loss factors

Documents: Traceability trail, declarations, invoices, permits, SOPs

Practical Evidence Checklist for Recycled Content Claims

Make claims auditable: trace the material, reconcile the numbers, prove the controls

Documentary Trail

- Supplier declarations / input specifications (source & pre-/post-consumer classification)
- Purchase & sales invoices (baseline for mass balance / blending)
- Permits & legal authorisation (eligibility to operate)
- SOPs / work instructions (segregation or bookkeeping rules)

Data Integrity & Controls

- Key data points: input, output, yield, loss / conversion factors
- Calibration records for weighing & measuring equipment
- Site walk-through & sampling (segregation maintained in practice)
- Mass balance controls (allocation boundaries + product grouping logic)

Best practice: keep a simple reconciliation table per site per period.

Environmental Benefits: Why Recycled Plastics Are a Key Lever

Recycled resins can often significantly reduce upstream carbon footprint vs. virgin plastics—especially in supply chain emissions.

- Main benefit: lower carbon footprint compared to virgin resin
- Mechanical recycling often delivers strong energy & resource efficiency gains
- The benefit typically shows up in Scope 3 Category 1 (Purchased Goods & Services)

Scope 3: Biggest Opportunity — and the Hardest to Quantify

Scope 3 often represents the largest share of emissions, but it is data-heavy and assumption-sensitive.

Key Points

• Many companies prioritise Scope 1 & 2 first, while Scope 3 hotspots remain under-identified. (**Materiality**)

• Reduction depend on supplier -/process specific factors (energy mix, yields, losses) **(Impact)**

• Generic / outdated secondary emission factors can distort results **(Integrity / Transparency)**

• Improve primary data coverage through supplier engagement and clear data requests. **(Inclusivity & Responsiveness)**

AccountAbility

Prioritise supplier-specific (primary) data where feasible

Common Issues in Scope 3 Accounting (Recycled Plastics)

What goes wrong

- Recycler, converter, and brand may all claim exclusive credit for the same reduction

How to fix

- Clearly define ownership via contracts
- Or disclose benefits as shared across the value chain

Double Counting

What goes wrong

- Mixing supplier-specific data with industry averages without labeling
- Hidden assumptions distort results and comparability

How to fix

- Tag data sources: Measured / Supplier-specific / Secondary average
- Explain boundary, year, and methodology assumptions

Mixed Data Without Clarity

What goes wrong

- Attributed recycled credits may not match the physical reality of a specific product
- Consumer-facing claims can become misleading

How to fix

- Use precise wording: “mass-balance attributed”
- Disclose allocation rules and system boundary (B2B at minimum)

Mass Balance “Free Allocation”

Third-Party Certification Landscape for Recycled Plastics

One goal, multiple standards — because supply chains and claims are not the same.

Why standards exist

- Validate recycled content with third-party assurance
- Ensure traceability / CoC across complex value chains
- Support market access & regulatory compliance

What differs across standards

- Where: Geography & use-case: EU / North America / Global supply chains
- Who: Who is certified: recyclers, converters, brand owners
- How: Traceability method: physical traceability vs controlled blending vs mass balance

Strategic comparison (at a glance)

Strategic Comparison: What Each Standard Is “Best For”

GRS (Global Recycled Standard)

- **Best for**: textile/apparel supply chains
- **Strength**: adds social / environmental / chemical requirements
- Content rule: ≥20% for B2B, ≥50% for product-specific consumer-facing labeling

APR PCR Certification (North America)

- Best for: PCR pellet/flake buyers & sellers in North America
- Strength: clear focus on post-consumer resin quality & traceability
- Eligibility Threshold: ≥90% PCR input (recycler certification)
- Focus on physical PCR resin content

RecyClass (EU plastics circularity)

- Best for: EU plastic value chain -- recyclers & converters proving origin & traceability
- Aligned with: EN 15343 + ISO 22095
- Stronger governance angle: Module C CSR required for applicants outside EU27+3 (e.g. SA8000/SEDEX or equivalent evidence)

EN 15343/ OK Recycled

- EN 15343: the technical backbone for traceability & recycled content calculation
- OK Recycled: scheme built on EN 15343 principles (program-level verification)

Spanish Plastic Tax: ENAC accredited scheme

ISCC PLUS

- Best for: complex chemical chains where segregation is not feasible
- CoC options: ISCC PLUS provides mass balance / physical segregation / controlled blending

Strength: mass balance attribution via verifiable bookkeeping.

Challenges in Audits & Certification Management — Quick Tips

Most non-conformities come from operational habits, not technical complexity.

Keep complete documentation (e.g., supplier declarations/RMDFs) and retain records as required.

Label everything: polymer type + batch ID + status (certified/non-certified); Store properly (clean, protected, traceable locations).

If part of the process is subcontracted, ensure it is covered in scope and material ownership/control is clear.

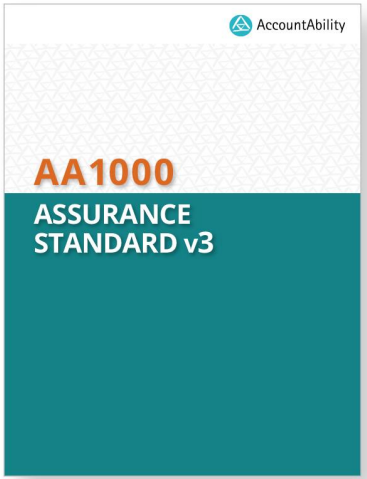
Do it annually (if required), and use it to find weaknesses — not as a tick-box task.

Prevent contamination and degradation (e.g., moisture, UV exposure) to avoid output variation

Conclusions & Practical Guidance for AA1000 Practitioners

What this framework delivers

- **Integrity**: certification & AA1000AS v3 turns claims into assurance-ready disclosures
- **Trust**: the four AA1000 principles strengthen stakeholder confidence and credibility
- **Leadership**: impact-focused reporting demonstrates genuine circular economy progress



What practitioners should do now

- Build high-quality data systems & strong internal controls
- Choose certification schemes that match capability & stakeholder expectations
- Stay forward-looking: regulation is moving from voluntary → mandatory

Summary Checklist (AA1000-aligned recycling assurance)

- **Inclusivity:** ethical + traceable engagement across the value chain
- **Materiality**: focus on high-impact polymers & streams (PCR vs PIR)
- **Responsiveness**: substantiated answers on chemical safety & greenwashing risk
- **Impact**: activity-specific factors + protected from double counting
- **Evidence**: “one-step forward, one-step back” trail & calibrated data & 3rd-party certification

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THANK YOU Q&A

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