

# Circular Economy: Circular Value Creation in Industrial Procurement

The circular economy describes an economic model in which materials and products remain in use, reuse, reprocessing and recycling for as long as possible, instead of ending up as waste after a single use. For industrial buyers, this means making procurement decisions across the entire life cycle of products and materials. This transforms them from classic price negotiators into shapers of circular supply chains and value creation networks.

## Key facts

- The circular economy replaces the linear model of extraction, production and disposal with reuse, repair, remanufacturing and recycling.
- Key levers for buyers are material selection, product service life, take-back agreements and the sourcing of recycled/secondary materials.
- Typical KPIs are the recycling rate, the secondary material share and the reuse rate of components.
- Legal drivers in the EU include, among others, sustainability reporting obligations and production standards such as the relevance of ecodesign requirements; the specific implementation must be examined case by case.
- In practice, circular procurement requires adapted supplier evaluations, modified specifications and new contract clauses.
- Circularity can lower costs, increase security of supply and reduce supply chain risks, but requires investment in transparency and processes.

## Definition: circular economy

The circular economy is a model of production and consumption that aims to close material loops: resources are returned to value creation after their initial use. In an industrial context, this includes various recovery stages that differ in their level of value creation.

## Distinction from the linear economy

The linear model follows the pattern of raw material extraction, manufacture, sale and disposal. The circular economy breaks this one-way street by systematically collecting, reprocessing and reusing products and materials after their service life. For buyers, this changes the frame of reference: it is not only the unit profit of a single procurement transaction that matters, but the overall balance across multiple life cycles. A procurement guideline can define in which categories circular criteria must be considered in the specification from the outset.

## Circular value tiers: 4R and 9R

Tiered models have become established in the technical literature, often referred to as 4R or 9R strategies. The value tiers range from refuse (avoiding critical substances) and reduce (material reduction) via reuse and repair through to remanufacturing, repurposing and recycling. The higher the

tier, the more value is retained in the product. Buyers should specify clearly in tenders and specifications which tier is being targeted, as recycle quality and remanufacturing place significantly different requirements on suppliers.

### **The role of procurement in the circular economy**

Through specifications, supplier selection and contract terms, procurement plays a decisive role in whether material loops can be closed technically and economically. In practice, around 60 to 80 per cent of product costs and environmental impacts are already determined during the design and procurement phase. Procurement also coordinates the return flow of materials, for example via used-part buy-back take-backs or deposit systems, and embeds these mechanisms in the category charter of the respective procurement category.

## **Methods and approach for circular procurement**

Circular procurement follows no standard recipe, but proves successful as a structured approach with clear category prioritisation, adapted specification processes and new contract types. It is built up step by step and can be integrated well into existing procurement processes.

### **Analysing material flows**

The starting point is a systematic analysis of your own material flows: which materials, components and packaging does the company procure in significant quantities, and where do they end up after use? A network analysis of the supply chain reveals which suppliers already have return-flow infrastructure or recycle capacities. In parallel, consumption-driven planning helps to make consumption data usable as a basis for circularity calculations. This makes it possible to identify categories in which circular solutions have the greatest leverage – typically metals, plastics, packaging and durable capital goods.

### **Adapting specifications and tenders**

Circularity must be embedded in the procurement documents: from material requirements and demands for disassemblability and documentation through to take-back clauses. A structured tender questionnaire with circular criteria – for example on secondary material share, repairability or end-of-life support – enables a fair comparison of bidders. Via the competitive dialogue, buyers can test with the market before the formal tender which circular solutions are technically and commercially realistic. For specialised return-flow and recycling providers, careful supplier onboarding is recommended, as these are often new supplier types outside the classic supplier base.

### **Contract models for circular models**

Circular business models change contract logic. Instead of purchasing fixed assets, product-related or circular usage models are increasingly coming to the fore: repair services, remanufacturing programmes with used-part take-back, leasing or material-as-a-service concepts. Such models require clear provisions on availability, maintenance, failure risks and contract duration. For materials, framework agreements with volume corridors for secondary materials provide stability, although the dynamics of recycle markets often show more volatility than primary raw material prices. Peripheral aspects such as take-back obligations and liability issues for used materials must also be clarified contractually; legal details should be examined on a case-by-case basis.

## Key KPIs of the circular economy in procurement

Circularity can only be managed if it is measurable. In practice, a number of KPIs have become established that are evaluated at category level and across the company. Since definitions vary by industry and company, each KPI should be underpinned by a clear calculation methodology.

### Material circularity rates

The recycling rate (proportion of waste that is routed to recycling) is a simple baseline KPI, but does not measure value creation. More meaningful are the secondary material share (proportion of recycled/secondary material in total material consumption) and the reuse rate for components and packaging. At item level, material metrics such as the recycle share per component provide concrete starting points for design alignment. Typical benchmarks: ambitious companies frequently target secondary shares of 20 to 50 per cent in selected categories, although the pure primary share still dominates for many materials for a long time.

### Circularity of capital goods and inventory

For capital goods, the KPI of average service life or the proportion of refurbished equipment describes the depth of the loop. In the warehouse and inventory context, the classic KPI set of inventory turns supports circularity: a high turnover rate reduces the volume of tied-up material and obsolete stock. The proportion of inventory items that become usable again through remanufacturing or repair rather than ending up as scrap is also a practical KPI for series spare parts and tools.

### Supplier-side circularity

In supplier evaluation, circular characteristics can be added as a separate criterion, for example the documented secondary material share, the existence of take-back concepts or the willingness to return materials. A bidder register, or an extended supplier evaluation with circularity criteria, makes these factors comparable across categories. It is important not to use such criteria as a rigid filter, but as part of a developmental approach that also includes development levers such as Ishikawa diagram sessions for root cause analysis where circularity performance is weak.

## Risks and controls in circular procurement models

Circular models offer great opportunities, but carry their own risks, which a structured control framework should address. These range from quality problems with secondary materials to contractual and dependency risks with new business models.

### Quality and specification risks with secondary materials

Regranulates, secondary metals and remanufactured components may exhibit fluctuating purity, tighter process windows or deviating mechanical properties. Remedies include tighter input specs, incoming inspections and clear marking in lot formation and traceability. In manufacturing processes, an accompanying quality method such as the Ishikawa diagram is recommended in order to analyse the causes of fluctuations in recycle quality in a structured way. Series-critical applications should be introduced step by step – first in non-critical applications, then through qualification stages into higher-value components.

### Supplier and dependency risks

Circular supplier systems are often regionally concentrated and technically demanding. Dual-source

management for critical recylate and remanufacturing suppliers limits the risk of failure. Regular supplier visits allow return capacities, storage facilities and process competence to be checked directly – for recycling providers this is often the most important inspection point in practice. Supplier onboarding for new circular partners should also require standardised evidence of substance inventories, take-back processes and documentation; where necessary, procurement can systematically use a request for supplementary documents during qualification.

### **Economic and contractual controls**

Circular models require multi-year thinking, which can conflict with classic budget cycles and price comparisons. A complete total cost of ownership comparison that includes disposal costs, return logistics, refurbishment and material losses creates transparency. Legal points – such as ownership of used materials, warranty provisions for remanufactured components, disposal obligations and evidence documentation – must be cleanly regulated contractually; the specific design should be legally reviewed. Finally, internal processes must be adapted: a streamlined low-value ordering process must not result in circular criteria being systematically bypassed for small volumes.

## **Current developments: regulation, digitalisation and market mechanisms**

The circular economy is shifting from voluntary initiative to regulated obligation. At the same time, new market mechanisms for secondary materials and digital tools are emerging that make implementation concrete for industrial buyers.

### **Regulatory drivers in Europe**

In the European Union, several strands of regulation interact: extended producer responsibility for packaging and electrical appliances, sustainability reporting obligations along the value chain, design requirements from the ecodesign framework, as well as initiatives for critical raw materials that, among other things, promote recylate content. EU conformity of products with circular requirements is also increasingly being regulated; the precise applicability to individual products and companies must be examined case by case. For buyers, this means that circularity requirements will in future come not only from their own sustainability strategy, but also from customers and regulators.

### **Digital material flows and product data spaces**

No data, no loops: digital material passports, standardised substance data and traceable batch information are becoming a prerequisite for trading in secondary materials. For buyers, substance lists and material passports will in future become part of the procurement documents, comparable to quality certificates. Digital procurement platforms also make it possible to search specifically for recylate and remanufacturing suppliers and to query them via structured requests (including the handling of bidder questions and alternative offers) – an effect that supports lean procurement because it reduces processing time.

### **New procurement strategies in the circular context**

Circularity is changing classic procurement strategies. Low-cost country sourcing, which long focused on distance and price, is being partially supplemented or replaced by regional circular systems for material flows with return logistics. For critical materials, a supply strategy is emerging that treats secondary materials not as a stopgap but as an equal source. Buyers should record these shifts in their

category strategy, allocate resources concretely through procurement capacity planning, and route internal approvals for new circular models through a defined procurement approval workflow, so that circular investments are decided with clear governance.

## Typical metrics

### **Secondary material share: typically 10–50 % by category**

Proportion of recycle/secondary materials in total material consumption; target value depends heavily on the material.

### **Recycling rate: > 90 %**

Proportion of waste that is routed to recycling; baseline threshold for production.

### **Reuse rate (components): typically 20–40 %**

Proportion of recovered components that can be reused through remanufacturing or repair.

### **Inventory turns: > 8 per year**

A high stock turnover rate reduces tied-up material and obsolete stock and supports circularity.

## Practical example

A medium-sized mechanical engineering company with around 800 employees is engaging with the circular economy systematically for the first time, after a major OEM customer included circular KPIs in its supplier management. The head of procurement starts with a material flow analysis for three categories: steel separator plates, plastic transport containers and hydraulic units from the service business.

- Material flow analysis: inventory and consumption data from the ERP system are processed using consumption-driven planning in order to quantify the volumes that are actually relevant to the loop.
- Market exploration via the competitive dialogue: before the formal tender, buyers clarify technical feasibility, quality levels and price ranges with five recycle and remanufacturing suppliers.
- Contract and process design: framework agreements with defined volume corridors for secondary steel and used-part take-back for hydraulic units are released via a structured approval workflow in procurement.
- Introduce a KPI set: procurement establishes the secondary material share per category and the reuse rate for hydraulic components, and embeds circular criteria in the category charter and supplier evaluation.

## Conclusion

For procurement, the circular economy is not a side issue but a structurally transformative business model with a direct impact on specifications, the supplier portfolio and contract architecture. Success depends less on individual recycling projects than on systematic integration into category strategies, KPIs and processes. Those who analyse material flows early, qualify reliable secondary sources and put clear contractual take-back arrangements in place reduce dependencies and secure competitive advantages. Circularity requires patience and closer collaboration with development, production and logistics. Buyers who set the course now are actively shaping the value creation of tomorrow – rather than having it imposed on them by regulation and customers.

## Frequently asked questions

### What does the circular economy mean in simple terms?

The circular economy means that materials and products are not disposed of after use, but are reused, repaired, reprocessed or recycled. This keeps the value within the product or material instead of ending up as waste. In industrial procurement, this covers material selection, the take-back of used parts and the sourcing of secondary materials.

### What role does procurement play in the circular economy?

Through specifications, supplier selection and contract terms, procurement plays a decisive role in whether material loops can be closed. It qualifies new providers for recycling and remanufacturing, negotiates take-back and usage models, and monitors circular KPIs such as the secondary material share. Integrating circularity criteria into supplier evaluation and category strategy also falls within its area of responsibility.

### What are typical KPIs for the circular economy in procurement?

Typical KPIs are the recycling rate, the secondary material share of total material consumption, the reuse rate of components or packaging, and the average service life or repair rate of capital goods. On the inventory side, the inventory turns KPI supports circularity by reducing tied-up stock. Definitions vary from company to company, so each KPI should be underpinned by a clear calculation methodology.

### What are the risks of sourcing secondary materials?

The most common risks are fluctuating material quality, tighter process windows during processing and dependence on regionally concentrated suppliers. These can be managed through clear incoming specifications, lot marking with traceability, accompanying root cause analysis and dual-source management for critical materials. Contractually, ownership of used materials and warranty provisions for remanufactured components should be clearly regulated.

### Is the circular economy economically worthwhile for industrial companies?

In many categories, circular models can deliver an economic justification, particularly when disposal costs, raw material price volatility and the extension of product life cycles are included in a total cost of ownership analysis. The payback period depends on material type, logistics effort and the quality of the return-flow infrastructure. Before rollout, a pilot category is recommended in order to test the business logic with real data.

### How do you get started with the circular economy in procurement in practical terms?

A proven approach is: analyse material flows, select one or two categories with high volumes and simple loops (typically metals, packaging or transport containers), engage with the market through a competitive dialogue, conclude a pilot contract and measure the results in KPIs. From there, expansion to further categories and integration into specification and supplier processes follows.