

STRATEGIC PERSPECTIVE

PPWR and Rising Raw Material Costs: **Four Operational Levers** for Packaging Manufacturers in Europe

How European packaging manufacturers protect margin under dual pressure — **without capital investment**. A shop-floor playbook for operations leaders.

EXECUTIVE SUMMARY**This paper is written for**

- ✓ COOs, Plant Managers & Production Directors at European packaging manufacturers
- ✓ CEOs and GFs of corrugated, folding carton, or flexible packaging companies
- ✓ Operations leaders who want concrete action — not regulatory theory
- ✓ Anyone responsible for making production perform better, today

This paper is not

- ✗ A regulatory primer or PPWR compliance checklist
- ✗ Written for brand owners (they face different obligations)
- ✗ An academic overview of sustainability trends
- ✗ For operations already achieving world-class OEE with near-zero waste

European packaging manufacturers are navigating simultaneous pressure from two directions: structurally elevated raw material and energy costs, and the progressive implementation of the EU Packaging and Packaging Waste Regulation (PPWR). Both forces compress margin. And both respond to the same answer: operational excellence on the shop floor.

The opportunity does not require capital investment or large-scale transformation programs. It requires systematically improving what your operation already does. Four operational levers define this paper:



Material Efficiency: The true scrap rate at most plants is 2× higher than what is reported. Hidden cost potential: 5–15% of annual turnover.



Machine Efficiency: PPWR drives more format changes and shorter run lengths. Without standardised changeover processes, every new customer requirement costs capacity. With SMED, 20–50% changeover time reduction is consistently achievable.



Working Capital: SKU proliferation driven by PPWR's minimisation requirements increases planning complexity. Structured S&OP processes can reduce tied-up capital by 40–60% while improving delivery reliability.



Measurement Systems: CSRD already requires your customers to report supply chain resource data — and they will ask you for it. A measurement system that captures real shop floor data serves three purposes: internal improvement, CSRD compliance, and external benchmarking.

Packoneers supports packaging manufacturers in capturing these improvements — not as external consultants who implement and leave, but as coaches and working partners for your team. The improvement belongs to your organisation. Our role is to make it possible, faster.

1 A Market Under Dual Pressure

European packaging manufacturers have been operating under sustained cost pressure for several years. Raw material prices for paper, board, film, and inks remain structurally elevated compared to pre-2021 levels. Energy costs have approximately doubled in many plants. At the same time, customer consolidation has increased: large brand owners are reducing their supplier base while demanding more flexibility, shorter lead times, and lower prices.

In this environment, operational efficiency is not a project. It is a core competency that determines whether a manufacturer remains competitive. And into this environment, PPWR introduces a third structural factor.

PPWR — Key Facts & Regulatory Roadmap

What is PPWR?

- Regulation (EU) 2025/40 — directly applicable in all EU Member States without national transposition laws
- Replaces the Packaging Waste Directive 94/62/EC and establishes binding, EU-wide uniform requirements for all packaging placed on the market
- Primary addressees: brand owners and FMCG companies that place packaged goods on the EU market
- As a packaging manufacturer, your duty is to give your customer the data and documentation they need to prove recyclability, recycled content and substance limits

Key Requirements

- **Art. 6 – Recyclability:** from 2030, packaging must be at least 70% recyclable (Grade C); from 2038, at least 80% (Grade A or B).
- **Art. 7 – Recycled Content:** Mandatory minimum recycled content quotas for plastic packaging, staged to 2030 and 2040.
- **Art. 10 – Minimisation:** Maximum 50% void space in transport, grouped, and e-commerce packaging — driving format redesign at your customers.
- **EPR:** Producers finance collection, sorting, and recycling. Costs passed through licensing fees.

Expected Regulatory Roadmap

- **August 2026** PPWR applies. For manufacturers, the live duties are: substances of concern & PFAS (food-contact), plus paperwork — unique ID, name & address, technical file and Declaration of Conformity.
- **2030** First tier of recycled content targets (Art. 7), void space limits (Art. 10), initial reuse targets for selected categories
- **2030–2035** Progressive reuse quotas for specific packaging categories
- **2040** Second, higher tier of recycled content targets (Art. 7)
- **2038/2040** Art. 6 requirements extend to packaging designs introduced before 2026

The bottom line

PPWR obligations rest primarily with your customers (brand owners). They will translate these requirements into procurement specifications, qualification criteria, and data requests — on their timeline, not yours.

The operational consequence: new materials with higher recycled content will require adjusted process parameters. Format changes will increase changeover frequency. Customer requests for production data will intensify. None of these pressures wait for regulatory certainty — they begin as soon as your customers move into implementation mode.

Two Types of Manufacturers. Two Very Different Outcomes.

Manufacturers who will navigate this transition successfully share one characteristic: they already run their operations efficiently. For them, every customer-driven change — new material, new format, new data request — is a manageable operational task. Manufacturers who will struggle are those entering this transition with chronic inefficiencies. For them, every customer requirement will arrive as a cost shock.

Manufacturer A — Ready

- ✓ True scrap rate known, measured, and trending down
- ✓ Changeover processes standardised — independent of operator
- ✓ Measurement system provides auditable production data
- ✓ Working capital managed through structured S&OP
- ✓ Customer changes absorbed as routine

Manufacturer B — Exposed

- ✗ ERP scrap rate ≠ actual material loss
- ✗ Changeover time depends on which operator is running
- ✗ No data foundation for customer compliance requests
- ✗ High raw material stock without planning system
- ✗ Every customer change arrives as a cost shock

PPWR does not create this divide. It reveals it — and widens it.

2 Four Levers. Each Valuable Now. Each PPWR-Ready.

PPWR affects four operational dimensions in your plant — regardless of whether your customers have finalised their packaging redesigns. Each of these pressure points is simultaneously a lever: acting early creates efficiency and cost advantages before external pressure arrives.



1 – Material Efficiency & Scrap

- Raw materials = 40–60% of total production costs
- New materials under PPWR behave differently on existing lines
- Same process + new material = higher run-up scrap
- Hidden cost potential: 5–15% of annual turnover



2 – Machine Efficiency & Changeover

- PPWR → more formats, more frequent changeovers
- New materials = new process parameters at setup
- Without SMED: every new requirement costs capacity
- With SMED: 20–50% changeover reduction is proven



3 – Working Capital

- More SKU variants → more material types to stock
- PPWR minimisation → more format changes → more complexity
- Unstructured planning replaced by safety stock logic
- Structured S&OP: 40–60% WC reduction achievable



4 – Measurement Systems

- ERP scrap ≠ real material loss (factor 2 gap)
- CSRD requires auditable supply chain data — now
- Measurement makes improvement visible and provable
- One system serves internal, regulatory, and customer needs

The four levers are independently actionable. Each delivers immediate financial impact — regardless of what PPWR ultimately changes in your customer's product portfolio. Together, they build the operational foundation that absorbs any PPWR-driven requirement.

3 Lever 1 — Material Efficiency & Scrap

The Single Largest Cost Lever in Your Plant

Raw materials represent 40 to 60 percent of total production costs in paper-based and cartonboard packaging. This makes material efficiency the most direct financial lever available to any packaging manufacturer. The question is not whether waste reduction matters — it is whether your plant is systematically managing it.

Most plants are not. And the reason is rarely poor intent. It is the absence of standards, visibility, and a shared understanding that every sheet, every board, every running metre counts. When waste is invisible, it is unmanaged. When it is visible, operators, shift leaders, and plant managers change their behaviour — without any capital investment required.

Concrete Actions — No Investment Required

The following measures consistently produce 2 to 5 percentage point improvements in effective scrap rates, typically within 8 to 16 weeks of implementation:

-  **Standardise run-up sequences.** Define the exact setup sequence, settings, and first-off check for every product family. Write it down. Train it. Make deviation visible. The gap between an experienced operator's run-up waste and a new operator's is rarely about skill — it is about the absence of a documented standard.
-  **Make waste tangible in real time.** A physical waste tally board at each machine — visible to every operator every shift — changes behaviour faster than any ERP report reviewed a week later. When the waste counter is expressed in cost (EUR/m²) or CO₂ equivalents, the impact is faster still.
-  **Optimise running speed for yield, not only output.** Many plants run at or near maximum machine speed. The optimal speed — balancing throughput with quality and waste — is often 10 to 15 percent below maximum. This is a process parameter decision, not an investment decision.
-  **Implement first-off verification.** A mandatory, documented first-off quality check before the full run starts eliminates 60 to 80 percent of run-up waste on repeat orders. The check takes 5 minutes. The savings are structural.
-  **Transfer best-shift practices across shifts.** If Tuesday morning shift consistently produces 2 percent less waste than Thursday evening, that is data, not luck. Document what they do differently and transfer it. Cross-shift learning is one of the fastest and most underused improvement mechanisms in packaging production.
-  **Classify waste at the source.** Operators should tag waste type (run-up, process, quality, skeleton) at the moment of production — not ERP clerks at the end of the month. Real-time classification makes the improvement roadmap obvious.

The core message

Every sheet counts. Every board counts. Every running metre counts. When your team understands this — with the data to prove it and the standards to act on it — scrap reduction becomes a daily habit, not a project.



Raw materials account for 40 to 60 percent of total production costs — the single largest cost lever in a paper-based packaging plant.

The PPWR Dimension

PPWR adds a further reason to act now. New materials with higher recycled content can behave differently on existing lines: different sealing temperatures, different print parameters, different behaviour at run-up. Plants without systematic scrap management will experience these transitions as uncontrolled cost increases.

There is also a direct economic argument: recycled-content materials typically carry a price premium over virgin fibre. A plant that maintains the same scrap rate while switching to premium input materials pays the cost twice — once in procurement, once in waste.

40–60%

Raw material share of total production costs

1% = 10

FTE — scrap reduction of 1% equals the annual cost of 10 full-time positions

5–15%

Hidden cost potential as a percentage of turnover

REFERENCE · SCRAP REDUCTION — PAPER-BASED PACKAGING MANUFACTURER

Starting point: Multi-line folding carton operation. ERP-reported scrap: 8%. Actual measurement through waste walk and pull-size analysis: effective material loss of 20%, of which 12% was systematically invisible (run-up waste, sampling, process offcuts not captured in ERP).

Approach: Classification of all waste types (process, skeleton, setup). Measurement system setup. Standardisation of run-up sequences. Operator team training. Visual waste management on the shop floor.

Result: Effective scrap reduced from 20% to 15% within four months. Annual saving: several million euros. No capital investment. No changes to the packaging portfolio.

"Most plants have more room than their reported numbers suggest."

4 Lever 2 — Machine Efficiency & Changeover

The Hidden Capacity Loss

Changeover is unavoidable in packaging production. What changes under PPWR is its frequency and complexity. Article 10's packaging minimisation requirements will push your customers to redesign and rationalise formats — meaning more SKU transitions per shift, more frequent changeovers, and more interactions with machine parameters. This is capacity leaving through the front door.

What is missing in most plants is not the desire to change faster. It is a standardised, documented changeover process. In most operations, the duration and quality of a changeover depends heavily on which operator is running the machine. The variance between experienced and less experienced operators regularly exceeds 30 to 50 percent. Five changeovers per day with a 30-minute variance is 2.5 hours of productive machine time lost — daily, and structurally.

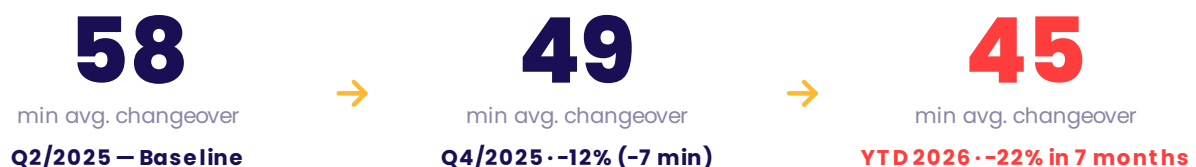
SMED: The Methodology That Changes This

SMED (Single Minute Exchange of Die) is the most proven methodology for systematic changeover reduction — not through new machines, but through method, standardisation, and team training. The core principle: separate internal activities (machine stopped) from external activities (preparation while the machine runs). Everything that can be prepared before the machine stops should never consume machine time.

Implementation follows a structured sequence: time analysis and video observation of the current changeover, classification of internal vs. external activities, technical and organisational improvements (pre-configured materials, 5S at the machine, clear role allocation), standardised SOP, team training, and KPI tracking. The result is a changeover that is independent of operator experience — consistent, measurable, and improvable.

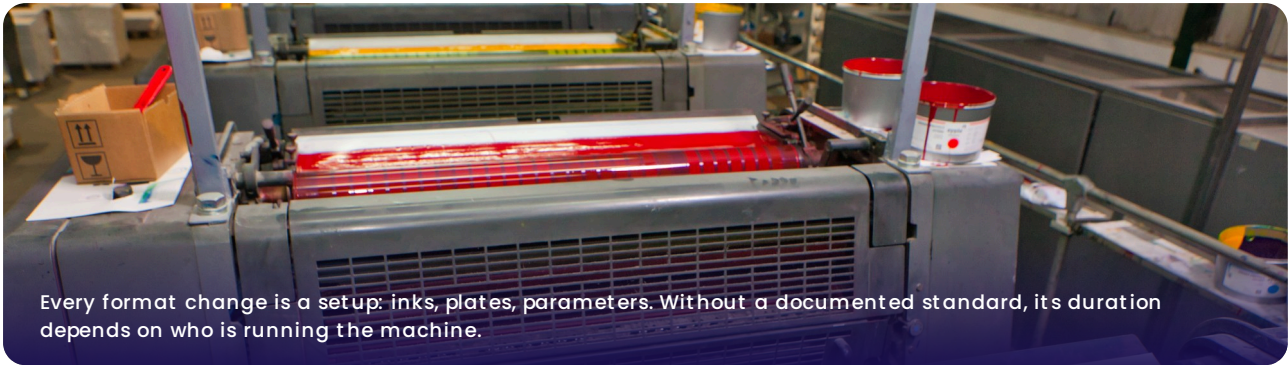
The Results: Data from Real Projects

The following results are from packaging production operations in Europe:



Result

22% Make-Ready time reduction in 7 months → **EUR 170,000 annual saving — from one machine.** Small change. Measurable impact.



REFERENCE · MAKE-READY OPTIMISATION — CORRUGATED / FOLDING CARTON PLANT (CASE 1 / 2)

Starting point: Average changeover time 58 minutes per job. Operator variance: up to 35 minutes. No standardised process documented.

Approach (SMED): Time analysis of all changeover steps via video recording. Separation of internal and external activities. Technical and organisational improvements: pre-configured materials, optimised machine layout (5S), clear role allocation. Implementation of standardised SOPs, team training, KPI tracking (changeover time, scrap, OEE).

Result: Changeover time 58 minutes → 41 minutes (-30%). Additional capacity at one machine: 480 hours per year — without investment in new equipment.

REFERENCE · ZERO POSITIONING ROLLOUT — MULTI-MACHINE PLANT (CASE 2 / 2)

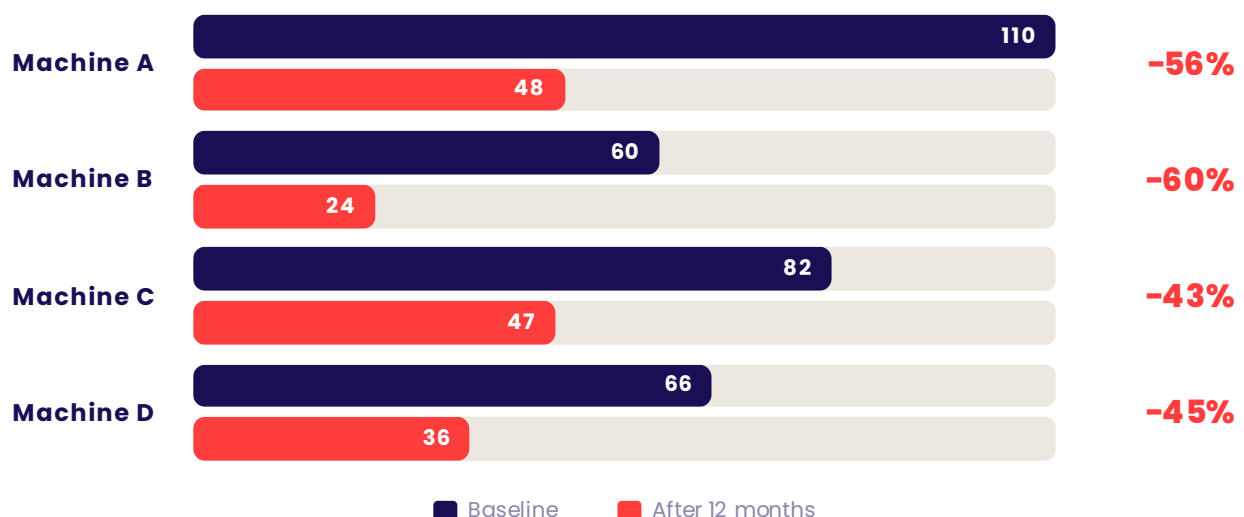
Starting point: Four machines, repeat orders only. Baseline changeover times: Machine A: 110 min · Machine B: 60 min · Machine C: 82 min · Machine D: 66 min.

Approach: Zero Positioning methodology. Consistent separation of all preparatory activities. Lighthouse pilot on one machine, then structured rollout to all four lines.

Result after 12 months: Machine A: 48 min (-56%) · Machine B: 24 min (-60%) · Machine C: 47 min (-43%) · Machine D: 36 min (-45%). Overall: 40–50% reduction in Make-Ready time across all lines.

Zero Positioning Rollout · Make-Ready time per line

Baseline (min) → after 12 months (min)



5 Lever 3 — Working Capital

The Real Driver: Variant Proliferation, Not Material Type

Working Capital in packaging manufacturing has historically been treated as a procurement and finance question. PPWR changes the operational context — and with it, the stakes.

Before assigning this to PPWR's recycled content requirements, it is worth being precise about where the real risk lies. In corrugated packaging — the largest paper-based packaging segment in Europe — approximately 88% of raw material input is already derived from recycled fibre (FEFCO, 2024). For corrugated manufacturers, recycled content is not a coming transition. It is the established standard. For folding carton and flexible packaging, the shift is more gradual and driven primarily by customer specifications, not a sudden structural change.

The actual Working Capital pressure from PPWR is more specific and more immediate: Article 10's packaging minimisation requirements force your customers to rationalise and redesign formats. This generates more SKU variants, more material specifications, and more frequent changeovers in your planning horizon. Without structured S&OP processes, the easiest response is buffer stock. Buffer stock ties up capital without improving service.

The Scale of the Opportunity

In plants without structured Sales and Operations Planning, raw material stock reach of 200 to 450 days is not unusual. For a plant with EUR 5 million in annual raw material spend, 450 days of coverage means EUR 6.2 million tied up in inventory — financing costs, storage costs, and obsolescence risk included. Structured S&OP processes — synchronising customer demand, production capacity, and raw material planning — can reduce stock reach to 80 to 120 days without compromising delivery reliability. In our experience, delivery performance typically improves, because planning replaces buffer as the primary response to demand variation.

450

Days stock reach (reference case starting point)

80–120

Target stock reach with structured S&OP (days)

40–60%

Achievable Working Capital reduction

REFERENCE · WORKING CAPITAL REDUCTION — BOARD PACKAGING MANUFACTURER

Starting point: Raw material stock reach of up to 450 days in board inventory. Manual planning on spreadsheets. High manual workload in customer service for VMI coordination.

Approach: Identification of focus items through ABC/XYZ analysis. Alignment of processes with modern S&OP principles. Implementation of a standardised planning tool. Definition and calculation of optimal planning parameters and safety stock levels. Improved transparency in customer demand management.

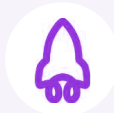
Result: 40–60% reduction in Working Capital while maintaining consistently high delivery reliability and customer satisfaction. A structural, sustainable change in planning logic.

6 Lever 4 – Measurement Systems & Data Transparency

Measurement Is What Makes the Other Three Levers Stick

Material efficiency, changeover performance, and Working Capital can all be improved without a sophisticated measurement system. But without one, the improvement is temporary, unverifiable, and invisible to external stakeholders. Measurement is what converts a project into a capability.

There are three distinct purposes a shop floor measurement system serves in the current environment: internal improvement, regulatory compliance, and customer qualification. All three matter. And in most plants, none of them are currently served by the existing ERP.



Internal Improvement

Real shop floor data drives daily operational decisions



Regulatory Compliance

Auditable data for CSRD disclosure obligations



Customer Qualification

Evidence that keeps you on your customers' supplier list

The ERP Gap

ERP systems record what employees enter. They do not record what actually happens. Waste generated at the beginning of a run is typically booked at the end – or not at all. Run-up scrap appears as 'material consumption', not as 'waste'. The result: ERP scrap figures systematically underestimate effective material loss by a factor of two. A plant managing its improvement programme against ERP data is managing against a number that does not reflect reality.

CSRD: The Data Request Is Already Here

Under CSRD, brand owners with more than 1,000 employees and more than EUR 450 million in turnover will be required from FY2027 to disclose resource use, waste, and circular economy metrics from their supply chains. Your customers' sustainability teams are already requesting production data from their suppliers: scrap rates, energy intensity, material utilisation. Suppliers without reliable, auditable data face qualification risk. Suppliers with structured shop floor measurement systems have a competitive advantage.

The regulatory reality

CSRD reporting is moving into force across your customer base. If your key customers are listed companies or subsidiaries of listed groups, the data request is already on your procurement team's agenda – or it will be shortly.

What the First Three Levers Enable — and What to Measure

Each of the first three operational levers produces improvements that are relevant to both internal management and external CSRD/PPWR reporting. The table below maps the key operational KPIs to their regulatory context:

Lever	Operational KPI	CSRD Standard	PPWR Link
Material Efficiency	Effective scrap rate · Yield per run · Material loss by type	ESRS E5-4 (resource outflows, waste generation)	Art. 6 quality data · Art. 7 recycled content claims
Machine Efficiency	OEE · Energy per unit · Changeover waste rate	ESRS E1-4 (energy) · E1-6 (GHG Scope 1/2)	Supports Art. 6 process performance data
Working Capital	Days of inventory · Overproduction rate	ESRS G1-5 (supply chain management)	Responsible sourcing · EPR cost efficiency

A measurement system that captures these data points in real time — at the machine, during the shift, not at the end of the month — serves all three purposes simultaneously: it supports daily operational decisions, provides auditable data for CSRD disclosure, and creates the foundation for Art. 6 recyclability process verification and Art. 7 recycled content claims.



What a Functional Measurement Setup Includes

- 
Shop floor data capture: automatic or semi-automatic recording of OEE, changeover time, and waste type at the machine — not via manual ERP entry.
- 
Waste classification by type: run-up waste, process waste, quality waste, and skeleton waste tracked separately.
- 
Real-time dashboards: for operators (self-regulation) and shift leaders (intervention at deviation).
- 
CSRD-ready reporting: aggregation in a format usable for internal decision-making and external customer requests.
- 
External benchmark calibration: measurement relative to comparable plants, not just against your own historical baseline.

7 Where Packoneers Comes In: Enabling, Not Replacing

We are not consultants who bring external solutions, implement them, and leave. Our approach is different: lasting improvement comes from inside an organisation — from a team that understands what it is doing and why.

Your team knows your machines, your materials, and your customers better than any external party. What is often missing is not knowledge — it is methodology, benchmark, and a structured approach to turning that knowledge into measurable results. That is what we provide. We work alongside your production managers, machine operators, and planning staff. We bring the methodology. Your team develops the solution. Together.

Our Approach in Four Phases



Diagnosis & Transparency 01

- 4 days on-site — no long-term commitment required
- Benchmark of your plant against 250+ packaging operations in our database
- Identification of top 3 improvement areas with quantified EUR value
- Output: a prioritised roadmap your team can own — not an external agenda



Joint Development 02

- We bring methodology (SMED, waste analysis, S&OP, measurement design)
- Your team brings operational context and plant knowledge
- Solutions are developed together — not over the heads of the workforce
- Gate decision after each phase: no long-term commit required



Training & Transfer 03

- We teach the why, not only the what
- A team that understands the methodology continues to improve independently
- SOPs written in your language — not external templates
- Shop floor communication designed for your culture and your team



Sustainability & Measurement 04

- KPI systems your team manages without external support
- Improvements measured against a documented baseline — not estimated
- Regular audits to secure gains and identify the next improvement cycle
- CSRD-ready reporting framework as a natural by-product

The Gate Principle

We work in phases with clear gate decisions. After each phase, you decide whether and how to continue. No long-term commitment. No dependency. Maximum transparency about the next step.

What remains when we leave: your team has the capability, the methodology, and the systems to maintain and extend the improvements independently. That is the real value — not the project, but the capability that outlasts it.

8 Conclusion: Preparation Is the Strategy

PPWR will not transform the packaging industry overnight. But it will — in combination with existing cost and competitive pressures — measurably widen the gap between well-prepared and poorly-prepared manufacturers.

The good news: the four levers required for PPWR readiness are the same ones that drive immediate margin improvement. Scrap reduction, changeover optimisation, Working Capital management, and measurement systems are not PPWR-specific projects. They are operational fundamentals that pay back from day one, independent of when any specific customer requirement arrives.

Manufacturers who will emerge from this period in a stronger competitive position do three things:



They measure their reality honestly — not their ERP figures.



They build the operational foundation before external pressure arrives.



They build the capability in their team — not dependency on external resources.

They know their numbers. And they have already started.

Production Efficiency Assessment

Find out where you stand — and where the biggest opportunity is.

In a focused 4-day on-site engagement:

- ✓ Benchmark of your effective scrap rate against 250+ plants (by packaging type and substrate)
- ✓ Identification of your top 3 operational improvement areas with quantified EUR potential
- ✓ Initial analysis of your changeover processes, measurement systems, and planning logic
- ✓ A prioritised action roadmap your team can act on immediately

No long-term commitment. Clear output. Gate decision after the diagnosis.

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