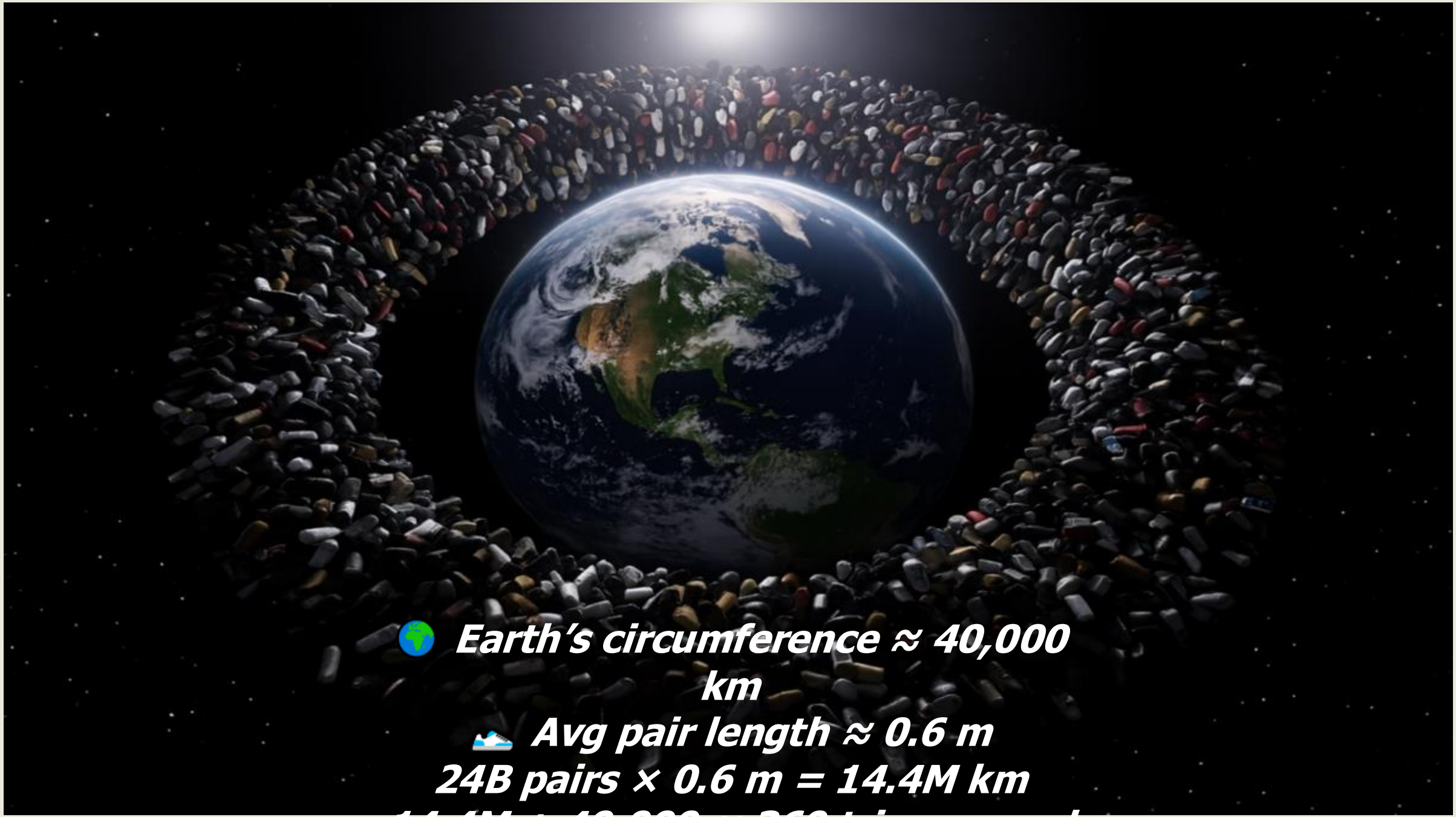
Cleaner Manufacturing and Construction

Sustainability and Innovation Summit 9.16.25

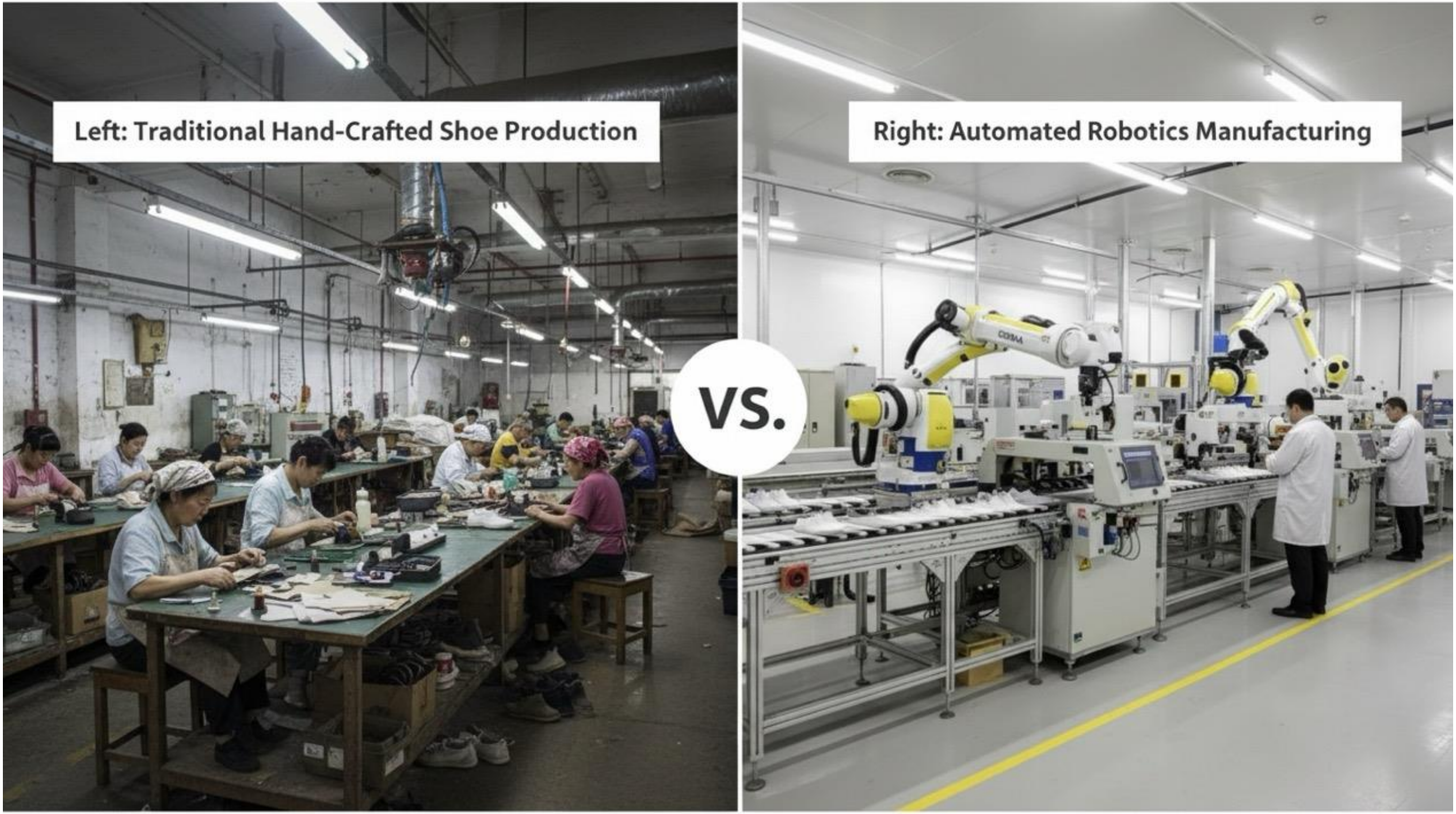

24 billion


🌍 Earth’s circumference ≈ 40,000 km
👟 Avg pair length ≈ 0.6 m
24B pairs × 0.6 m = 14.4M km
14.4M ÷ 40,000 ≈ 360 trips around

part I: the big problem…

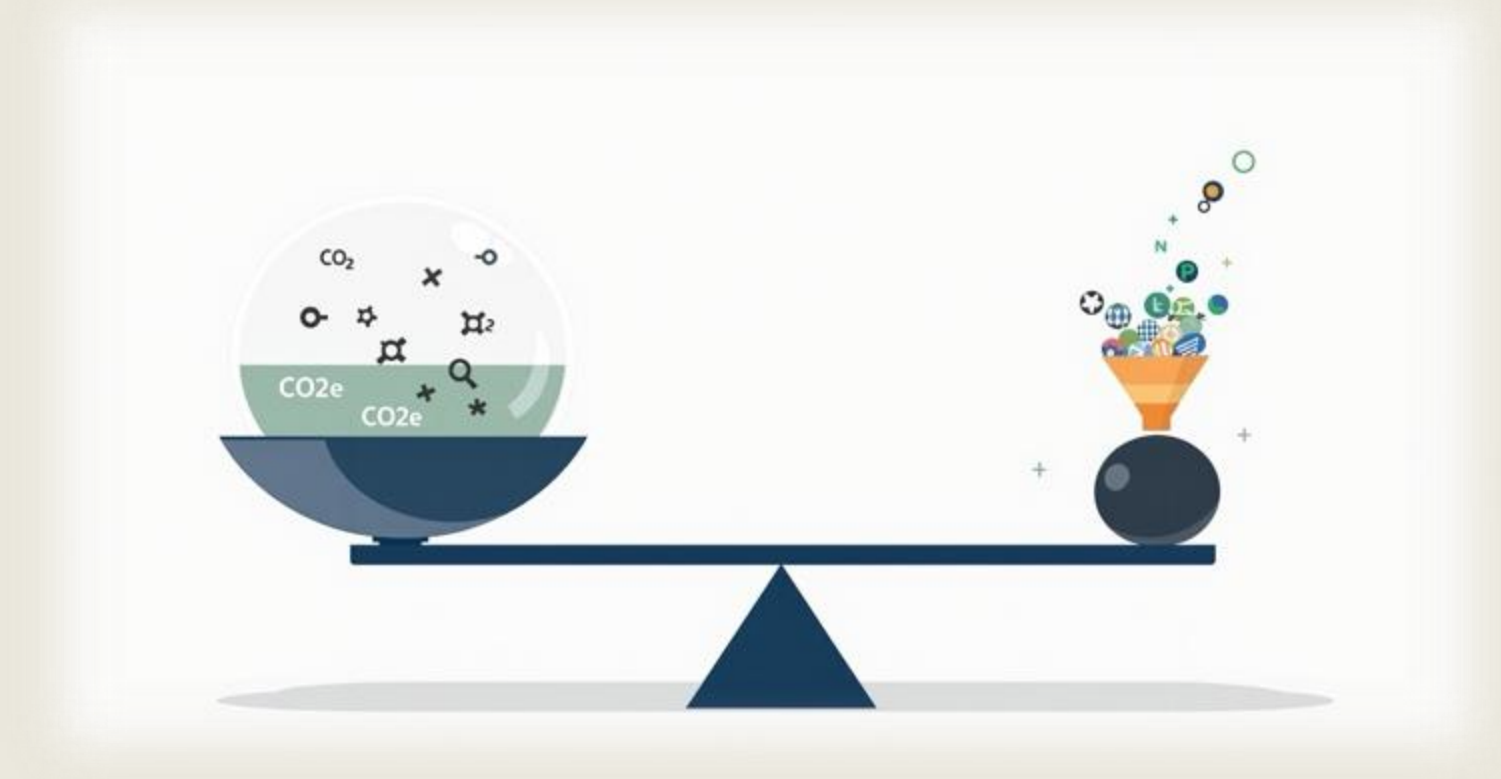
The Big Problem

- *Footwear = 1.4% of global GHG emissions.*
- *Avg pair = 36 kg CO_2e.*
- *90% end up in landfills.*
- *PFAS still in 100+ parts.*


Left: Traditional Hand-Crafted Shoe Production
VS.
Right: Automated Robotics Manufacturing

What 36 kg CO_2e Means – Everyday Comparisons

- **Driving:** ≈ 90 miles driven in a typical gasoline car (U.S. average)
- **Electricity:** ≈ 40 kWh of electricity (roughly what a U.S. household uses in 1–2 days)
- **Smartphones:** ≈ charging a smartphone 4,500 times
- **Beef burger:** ≈ the footprint of ~3–4 large beef burgers



90% of 24 Billion= Land fills

part II: industry reality check...

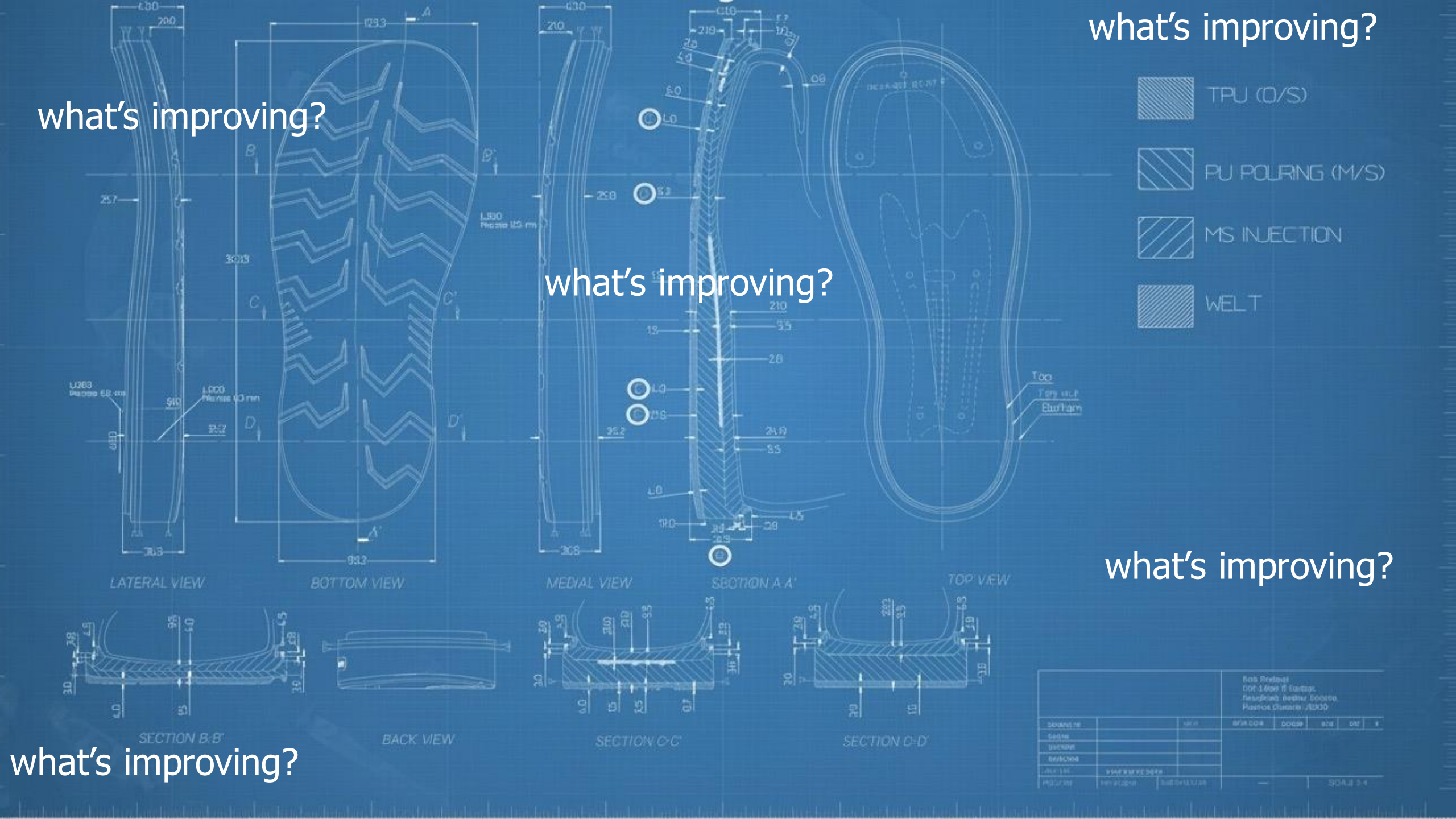
what's improving?

what's improving?

what's improving?

what's improving?

what's improving?



What’s Improving in Footwear Manufacturing

Innovation	What It Does	Why It Matters
Water-based adhesives	Replace solvents in bonding	Cleaner air, safer for workers
Bio-based PU foams	Plant oils replace fossil feedstocks	Cuts carbon, same durability
Bio-EVA foams	Sugarcane-derived cushioning	Lower fossil footprint
Alt-leathers (pineapple, apple, mushroom, algae, car seat)	Plant-based uppers & foams	Lower impact, consumer appeal
Hot-melt & bio-adhesives	Less toxic bonding systems	Fewer emissions, safer supply chain
Modular design & additive manufacturing	Shoes designed to come apart	Easier repair & recycling
Circular / take-back programs	Repair, resale, compostable builds	Reduces landfill, engages consumers

Why Manufacturing Matters

Cemented Construction

DIPU Construction

Cementing = hidden carbon load.

Factories rely on **40-meter cement lines, 50 workers brushing on glue**.

Cleaner = stronger: less glue means fewer delaminations.
Cleaner = smarter business: fewer materials, faster builds, less scrap.

Cleaner Manufacturing Proof Points

Direct Injection = Cleaner. Stronger. Smarter.
No glue, no solvents
One-piece durability — no sole separation
Cleaner factories — no cement lines, no toxins
Automated precision — consistent + scalable
Lower carbon — fewer steps, less waste
Circular-ready — designed for recycling + repair

CARE

Purpose-Built, Planet Conscious

Low-impact materials, zero- cement methods, and future-forward responsibility.

Cleaner Manufacturing Proof Points

midoribio inc

BIO-BASED EVA
Sugarcane in soles & foams

Bio-based Polyols (PU)

Olis (castor, algae) replace petro in soles/foams.
Cuts carbon, same durability.

Midori Bio

Additive that speeds biodegradation.

Bio-based EVA

Sugarcane-derived cushioning.
Softer feel, less fossil fuel.

Circular Builds

Modularity + design-for-disassembly.
Enables repair, recycling, resale

BIO-BASED PU
(POLYOLS)

CIRCULAR BUILDS / MODULARITY

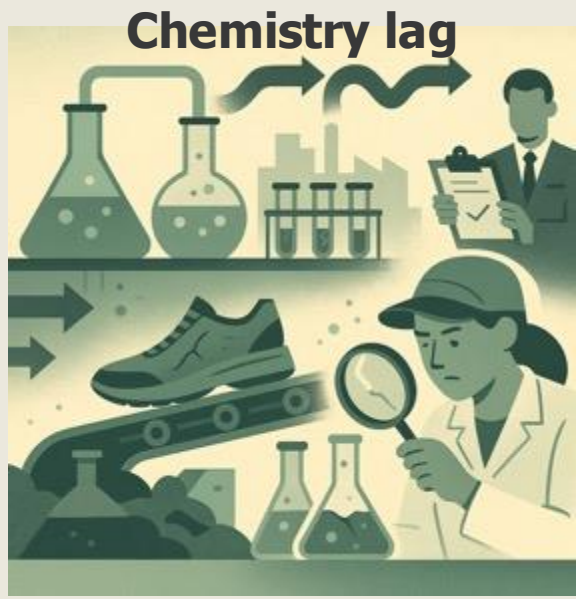
Cleaner Manufacturing Proof Points → *All Modular Builds*

Deconstructed Modular
Shoes designed in parts — upper, sole, midsole — that come apart cleanly.

Full Modular System
Entire shoe built from interchangeable parts → extend life, enable recycling.

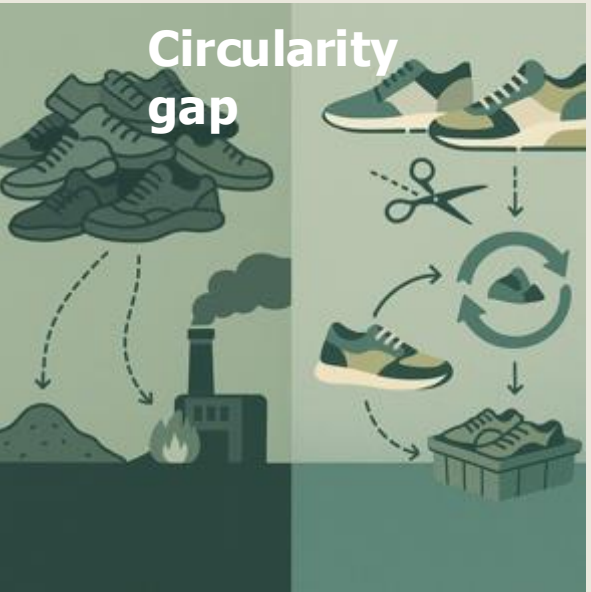

barriers to progress...

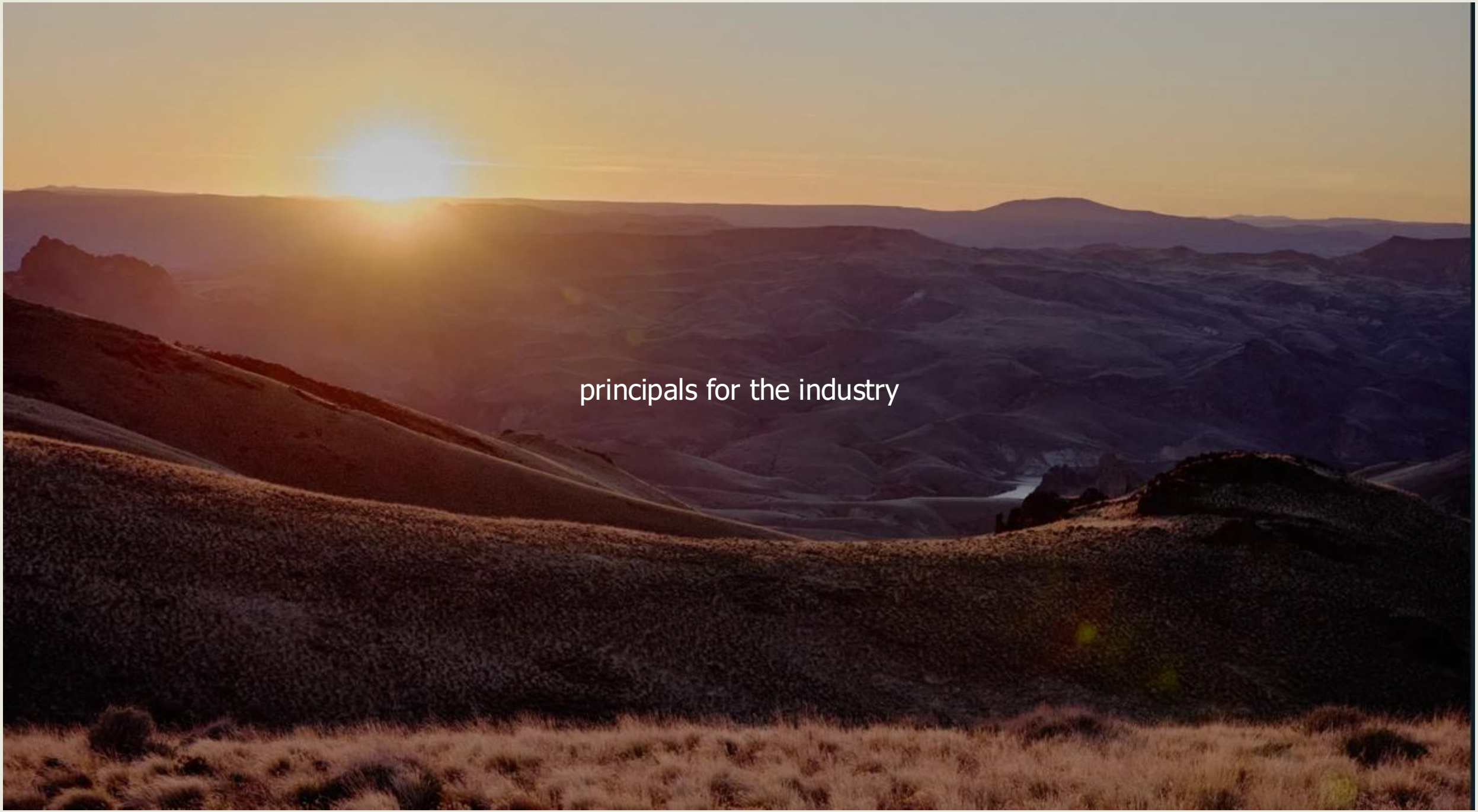
What’s Holding Us Back



❌ **What’s Holding Us Back**

- **Capex inertia** – Tooling changes & automation are costly upfront.
- **Chemistry lag** – Alternatives can underperform, sneak back via suppliers.
- **Circularity gap** – “Recyclable” claims often hollow without design-for-disassembly.
- **Grid reliance** – Many suppliers still rely on fossil-heavy grids.




principals for the industry

Cleaner Manufacturing Proof Points

1. **Simplify:** *Fewer parts, fewer overlays.*
2. **Design for disassembly.**
3. **Ban PFAS & toxic shortcuts.**
4. **Measure what matters (intensity + absolute).**
5. **Automate & nearshore.**
6. **Durability first.**
7. **Renewable Energy – Power with Renewables!**

How many individual types of PFAS chemicals exist?

a. ~500
b. ~3,400
c. ~6,100
d. ~10,000

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a. ~500
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c. ~6,100
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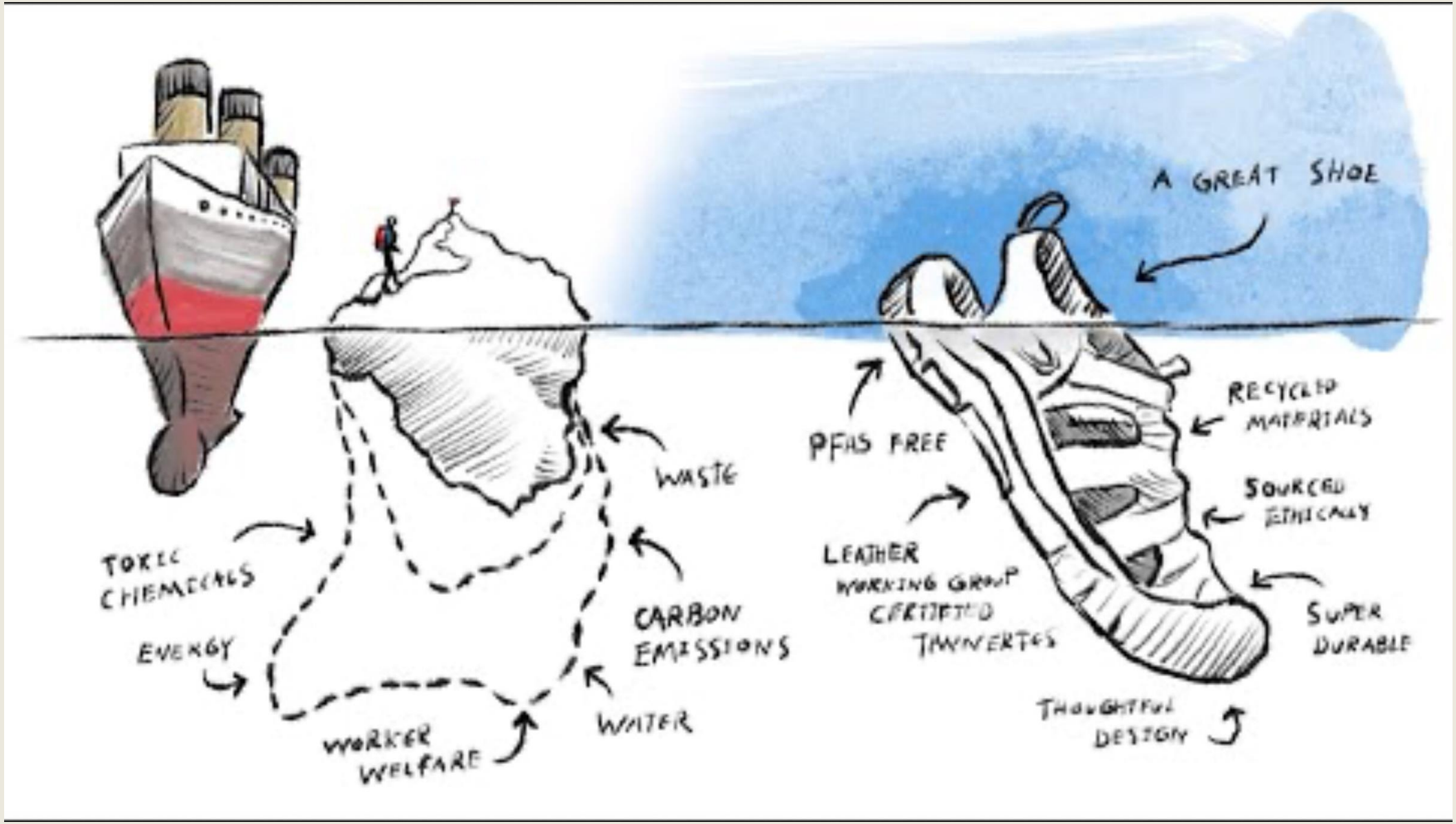
Industry Needs a “Consciously Creating” Mindset

Finding innovative ways to consciously create our shoes for a better planet.



Consciously Creating

Let’s all find innovative ways to consciously create our shoes for a better planet.

DETOX INITIATIVE

Commit to removing harmful chemicals from your entire range of footwear or supply chain. Follow the guidance set by The Green Science Policy Institute for the Six Classes of Harmful Chemicals and annually track and report your progress for each chemical group.

CHEMICAL GROUP	STATUS
PFAS	FREE SINCE 2018**
ANTIMICROBIALS	FREE SINCE 2018
FLAME RETARDANTS	FREE SINCE 2003
BISPHENOLS & PHTHALATES	98%+ FREE SINCE 2018*
CERTAIN METALS	FREE SINCE 2015
SOLVENTS	13% FREE IN 2024, INTENTION TO BE 20% FREE BY 2025 & 30% FREE BY 2030

* While we strive to be 100% free of bisphenols & phthalates, bisphenol A can be found in the source content of recycled polyester.

** Free of intentionally added PFAS

Consciously Creating

Finding innovative ways to consciously create our shoes for a better planet.

BETTER LEATHER

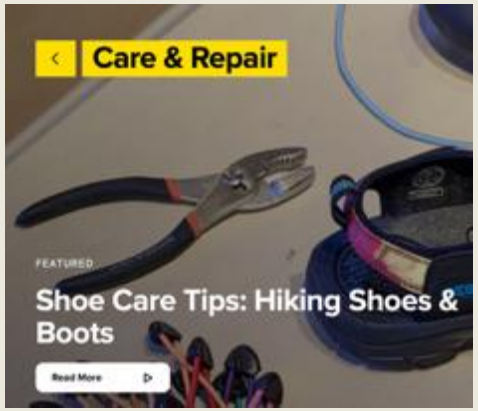
Our LWG commitment ensures that any tannery processing leather for KEEN has gone through an environmental and social audit, focused on the below areas:

- General Facility Details
- Subcontracted Operations
- Social Audit
- Operating Permits
- Production Data
- Incoming Material Traceability
- Outgoing Material Traceability
- Environment Management Systems (EMS)
- Restricted Substances, Compliance, and Chromium VI (CrVI) Management
- Energy Consumption
- Water Usage
- Air & Noise Emissions
- Waste Management
- Effluent Treatment
- Health, Safety & Emergency Preparedness
- Chemical Management
- Operations Management

LEATHER WORKING GROUP

DURABILITY = SUSTAINABILITY

RE.USE



Consciously Creating

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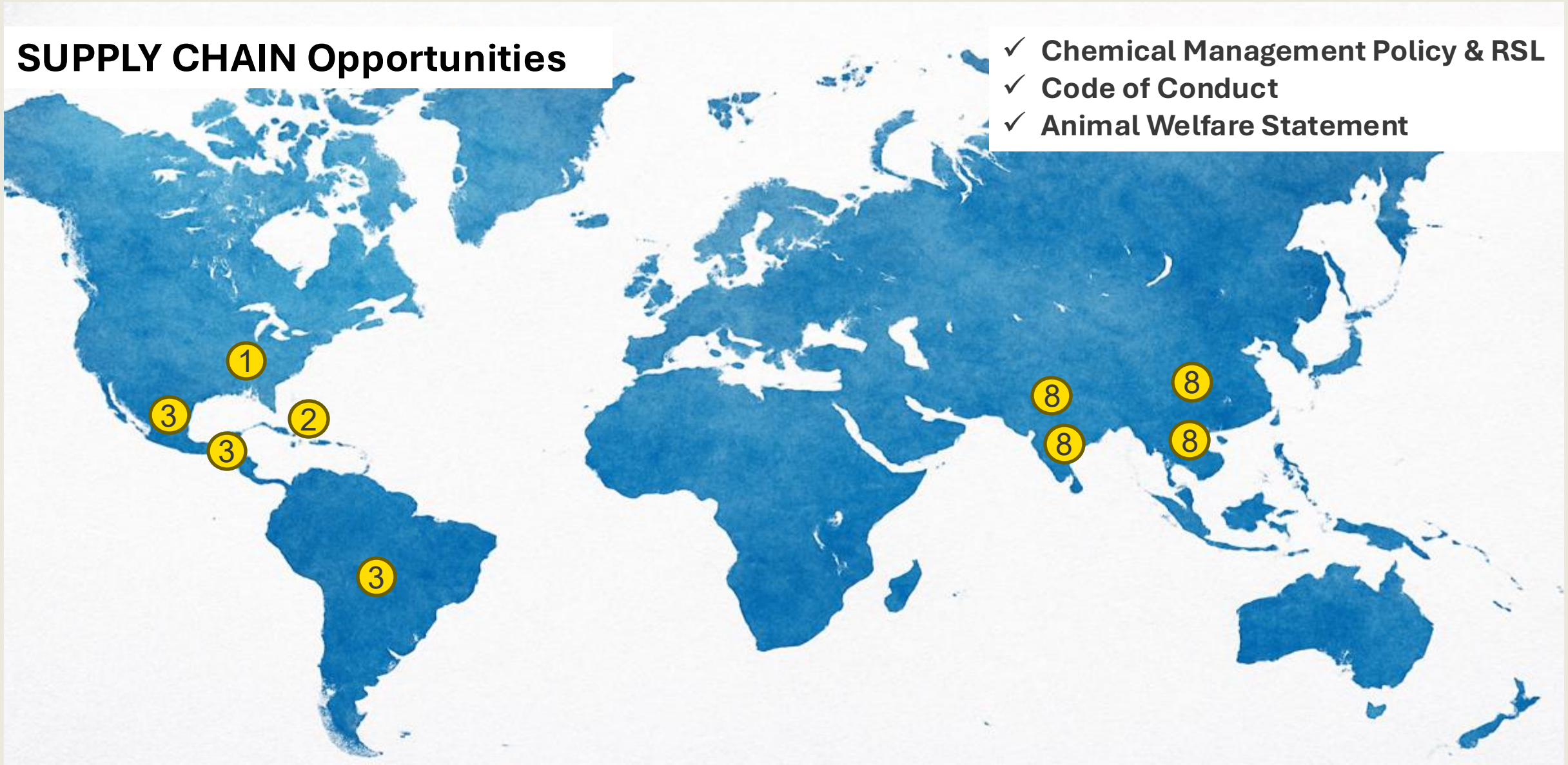

Consciously Creating

Finding innovative ways to consciously create our shoes for a better planet.

Make For Life

We think the most sustainable shoe is the one you can keep wearing. We find innovative ways to make shoes more durable, comfortable, and versatile.

Consciously Creating

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CIRCULARITY

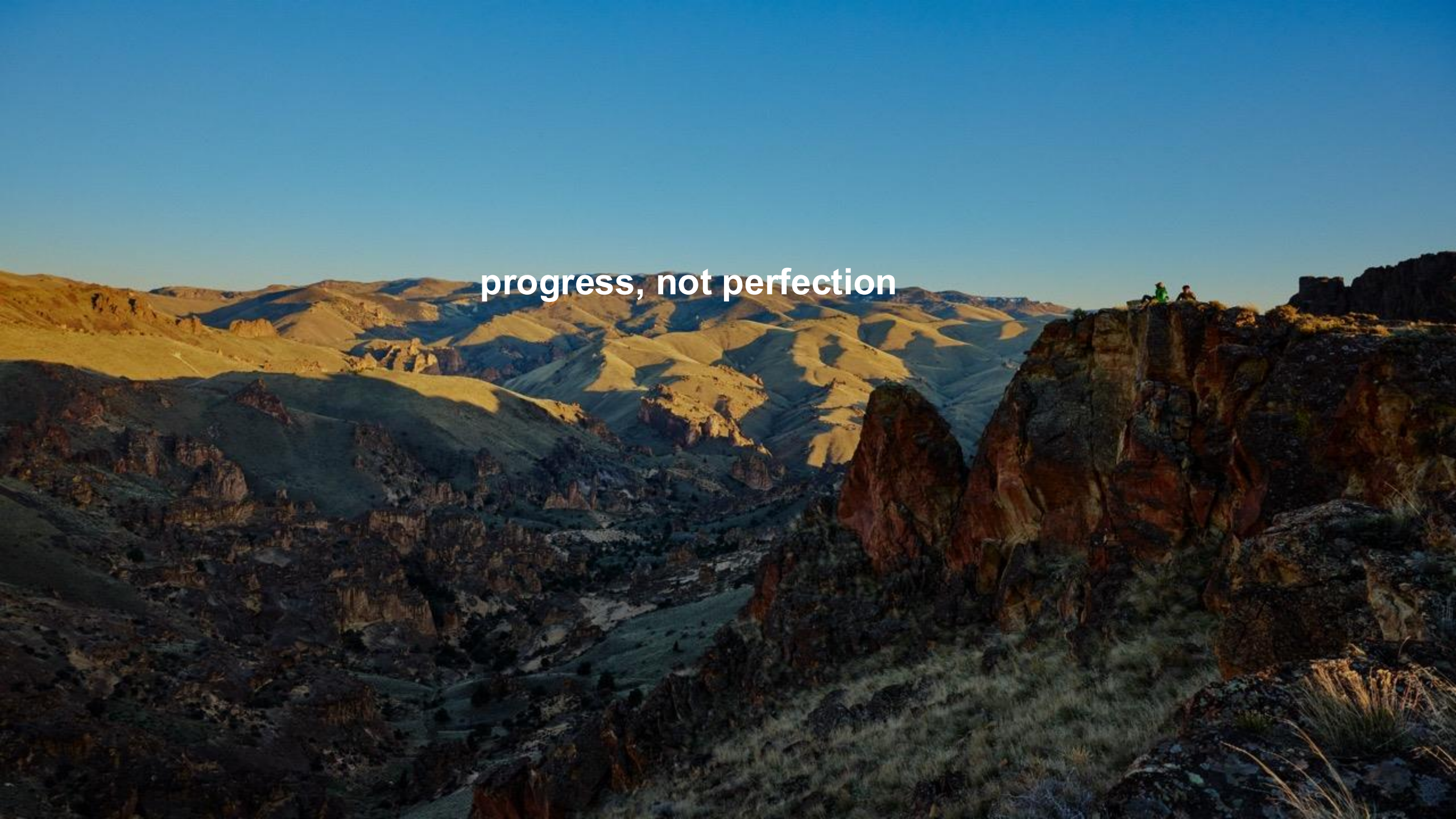
The circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources.

Consciously Creating

Finding innovative ways to consciously create our shoes for a better planet.

Circularity Principle	Goal	Solution
Maintain & Prolong	Prolong the usable life of a pair of [BRAND] by its current owner.	• {BRAND} Care & Repair
Reuse & Redistribute	Move wearable [BRAND] to a new user	• RE.[BRAND] (Phase 1) • Soles4Souls • All Hands & Hearts • Good360
Refurbish & Remanufacture	Restore [BRAND] to good working order through repair, part replacement, etc.	• RE.{BRAND} (Phase 2) • KEEN Care & Repair (Phase 2)
Recycle	Retain the value of the materials, avoid waste, & reprocess into something new	• {internal or 3rd Party}


a call to action...


progress, not perfection

TOP 5 REASONS YOU STAND OUT

1 

ADHESIVES

Pick One Franchise:
Cut adhesives by 50% in 12 months

2 

DIRECT INJECTION

Pilot Direct Injection or Modular Build:
Many options to intro this in a key franchise

3 

PFAS FREE

Require PFAS-free chemistry in all new briefs.

4 

RENEWABLES

Renewable Energy:
Push suppliers to invest in renewables.

5 

CIRCULARITY

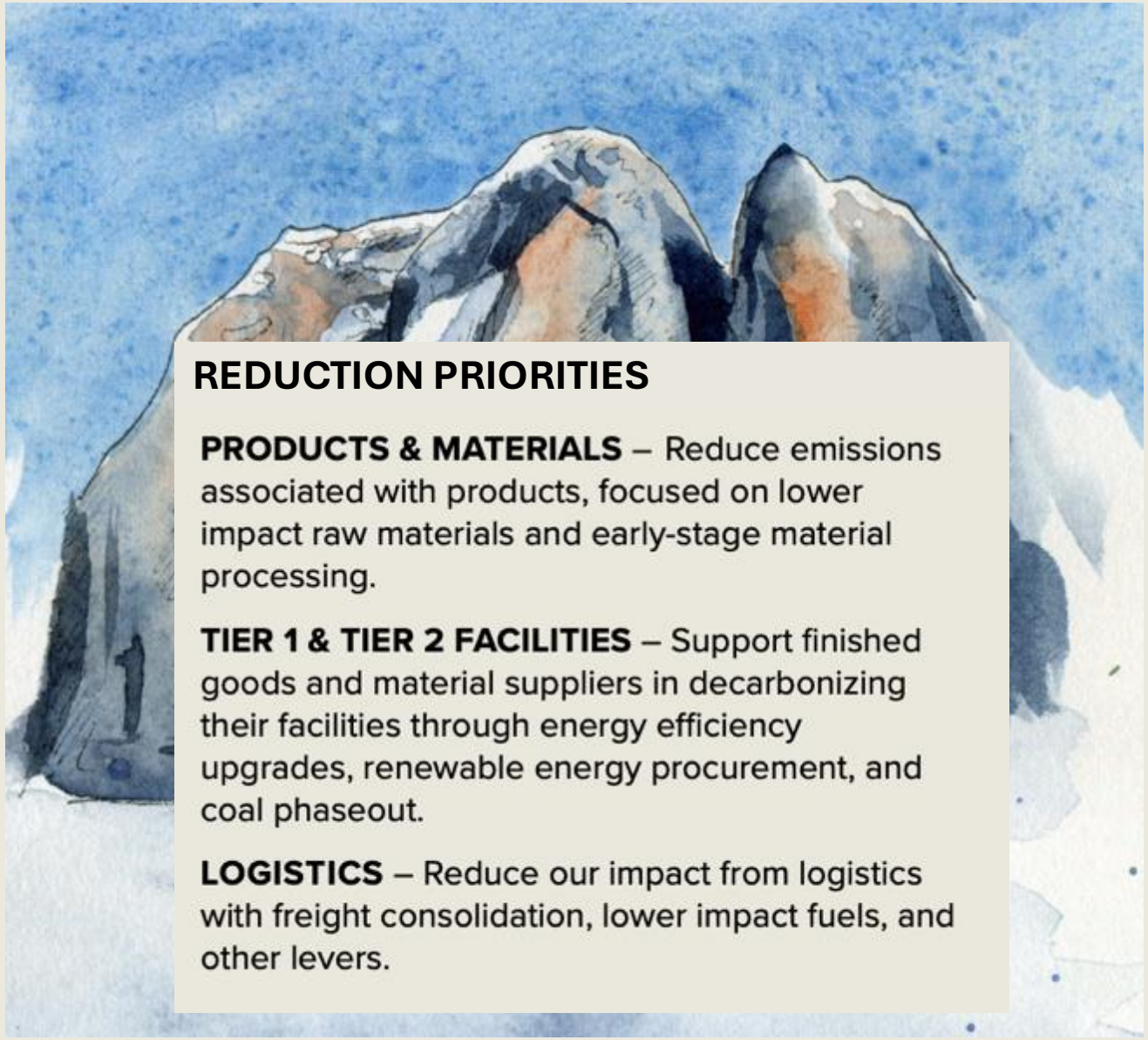
Circularity:
Build repair/resale into lifecycle.
.

Protecting the Planet

Working together to reduce our climate impact and protect Earth's resources.

PROUDLY RUNNING ON 100% RENEWABLE ENERGY

We secure Renewable Energy Credits (RECs) across all operating regions to power KEEN offices, garages, and our Fan Engagement Center

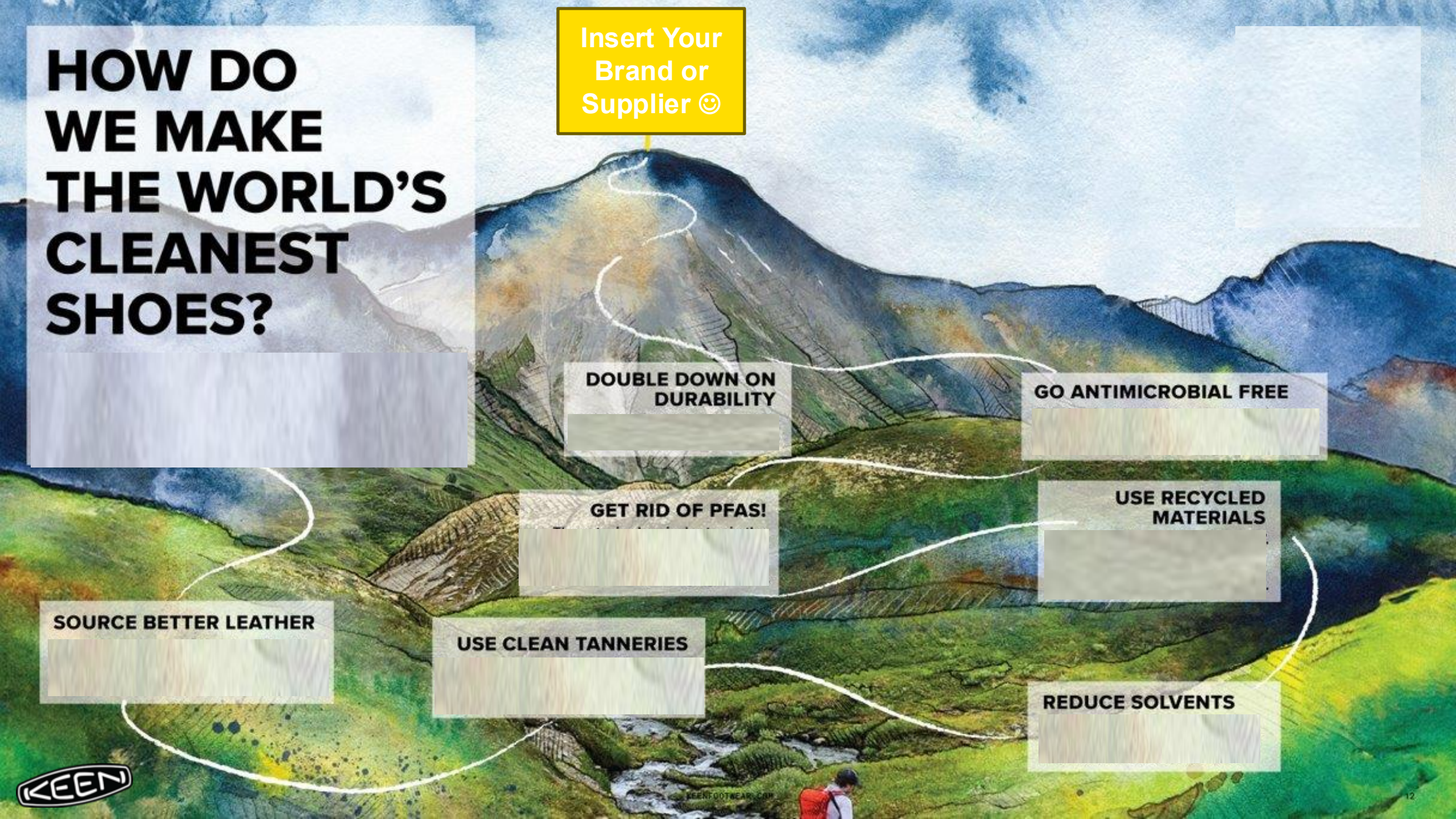


REDUCTION PRIORITIES

PRODUCTS & MATERIALS – Reduce emissions associated with products, focused on lower impact raw materials and early-stage material processing.

TIER 1 & TIER 2 FACILITIES – Support finished goods and material suppliers in decarbonizing their facilities through energy efficiency upgrades, renewable energy procurement, and coal phaseout.

LOGISTICS – Reduce our impact from logistics with freight consolidation, lower impact fuels, and other levers.


HOW DO WE MAKE THE WORLD'S CLEANEST SHOES?
Insert Your Brand or Supplier ☺
DOUBLE DOWN ON DURABILITY
GO ANTIMICROBIAL FREE
GET RID OF PFAS!
USE RECYCLED MATERIALS
SOURCE BETTER LEATHER
USE CLEAN TANNERIES
REDUCE SOLVENTS
KEEN

REDUCTION PRIORITIES

Focus Area	***What It Means***	***Example Actions***
Products & Materials ~50%	Lower the carbon intensity of raw materials.	Switch to bio-based PU/EVA, recycled uppers, lighter designs, fewer overlays.
Tier 1 Suppliers ~8%	Help factories transition to renewable energy.	Invest in solar, source renewable electricity, energy efficiency upgrades.
Tier 2 Suppliers ~19%	Decarbonize materials processors (textiles, rubber, chemicals).	Push suppliers to adopt renewables, support joint clean energy projects.
Logistics ~11%	Cut emissions from shipping and transport.	Shift from air to sea/rail, optimize routes, explore low-carbon fuels.
Own Ops (Scope 1 & 2) ~1%	Run offices/factories on clean energy.	Onsite renewables, RECs, efficiency (LEDs, HVAC, etc).

REDUCTION PRIORITIES

Category	***Example Actions***	***Typical Cost / Effort****
Sourced Renewables	Buy renewable energy credits (RECs), co-fund supplier solar installs, push grids toward renewables.	$20K–$100K per year
Facility Upgrades	LEDs, insulation, more efficient machines.	~$5K–$50K per site
Supply Chain	Invest in bio-based or recycled materials, modular builds, and cleaner chemistries.	$50K–$300K+ depending on scale
Product Innovation	Design for lighter weight, less glue, more recyclability, and repair/resale.	R&D + pilot project spend
Data & Tracking	Better carbon measurement tools to target hotspots.	Staff time / software


24 BILLION PAIRS.
What Legacy Will We Leave?

Cleaner Manufacturing & Construction

"Cleaner shoes don't have to be perfect—they just have to be cleaner than the last pair we made"

Q&A Prompt:

what’s your biggest blocker — chemistry, cost, capability, or courage???

if every shoe factory switched to cleaner builds tomorrow—no glue, no PFAS, renewable energy—what’s the single biggest barrier that would stop it from scaling?


THANK YOU