SKY CELL

Understanding Hybrid Containers

A detailed introduction to hybrid containers and how they are transforming pharmaceutical supply chains.

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Chapter 1

Executive Summary

A modern solution for modern supply chains

Pharmaceutical logistics is one of the most demanding supply chains in the world. Medicines are highly sensitive, regulators are uncompromising, and the cost of failure is measured in both human and financial impact.

Yet traditional solutions come with inherent limitations. Active containers require power, are complex to handle, and generate significant CO_2 emissions. Passive packaging is simpler but struggles with long journeys, extreme conditions, and often ends up as single-use waste.

> **SkyCell hybrid containers represent a new category. They deliver the performance of active systems, the efficiency of passive solutions, and the added intelligence of modern technology, materials, and data without the trade-offs.**

With self-recharging capability in cold environments, and an excursion rate <0.05%, hybrid containers protect medicines through every stage of the journey.

By lowering logistics cost, reducing CO_2 by up to 50%, and simplifying operations, SkyCell hybrid containers safeguard patient health and help pharma companies meet their sustainability and operational goals.

This whitepaper explains what hybrid means, how it differs from existing solutions, and why it's ideally suited for modern global pharmaceutical products transport.

Where can hybrid containers be used?

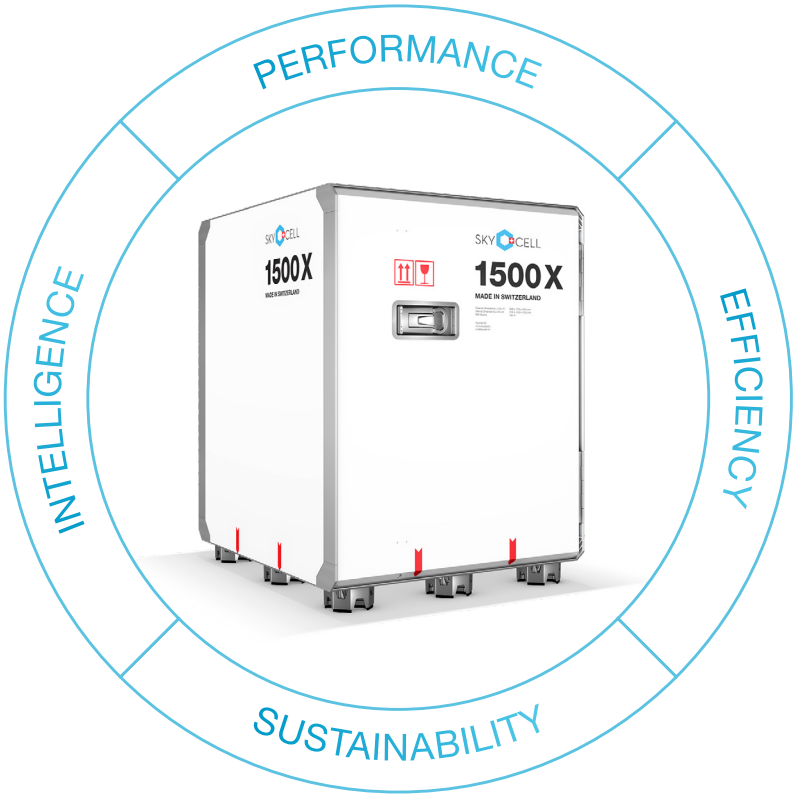
Hybrid containers can be used **anywhere** you can use active, passive, or advanced passive solutions. Due to the ease of handling, they are often **eligible for advanced passive or passive rates**, but offer all the protection of active containers.

They move seamlessly door to door (across air, road, and sea) without rollerbed trucks, plugs, or complex infrastructure requirements. From high-volume EU–US lanes to long-distance routes through hot or emerging markets, hybrid containers perform reliably in every environment.

Chapter 2

What is a Hybrid Container?

A new category of container



Hybrid = Performance + Efficiency + Intelligence + Sustainability

Hybrid containers are reusable, lightweight, and intelligent pharmaceutical protection systems designed for end-to-end global pharma supply chains. They combine the extended runtime and reliability of active containers with the ease of use and efficiency of passive solutions, while eliminating the drawbacks of both.

Unlike active systems, hybrids do not rely on plugs, batteries, or external power, yet they recharge naturally in cold chain environments. They also outperform traditional passive systems, maintaining temperature protection for over 270 hours at 20°C, making it suitable for extreme conditions. And unlike both, hybrids use advanced materials, integrated data capture, and predictive software to provide zero product loss, full visibility, total control, and a lower carbon footprint.

KEY TAKEAWAY

Hybrid combines the performance of active, the efficiency of passive, and adds sustainability + intelligence, to create a single solution that works everywhere, every time.

Chapter 3

The Container Challenge

Why the hybrid was needed

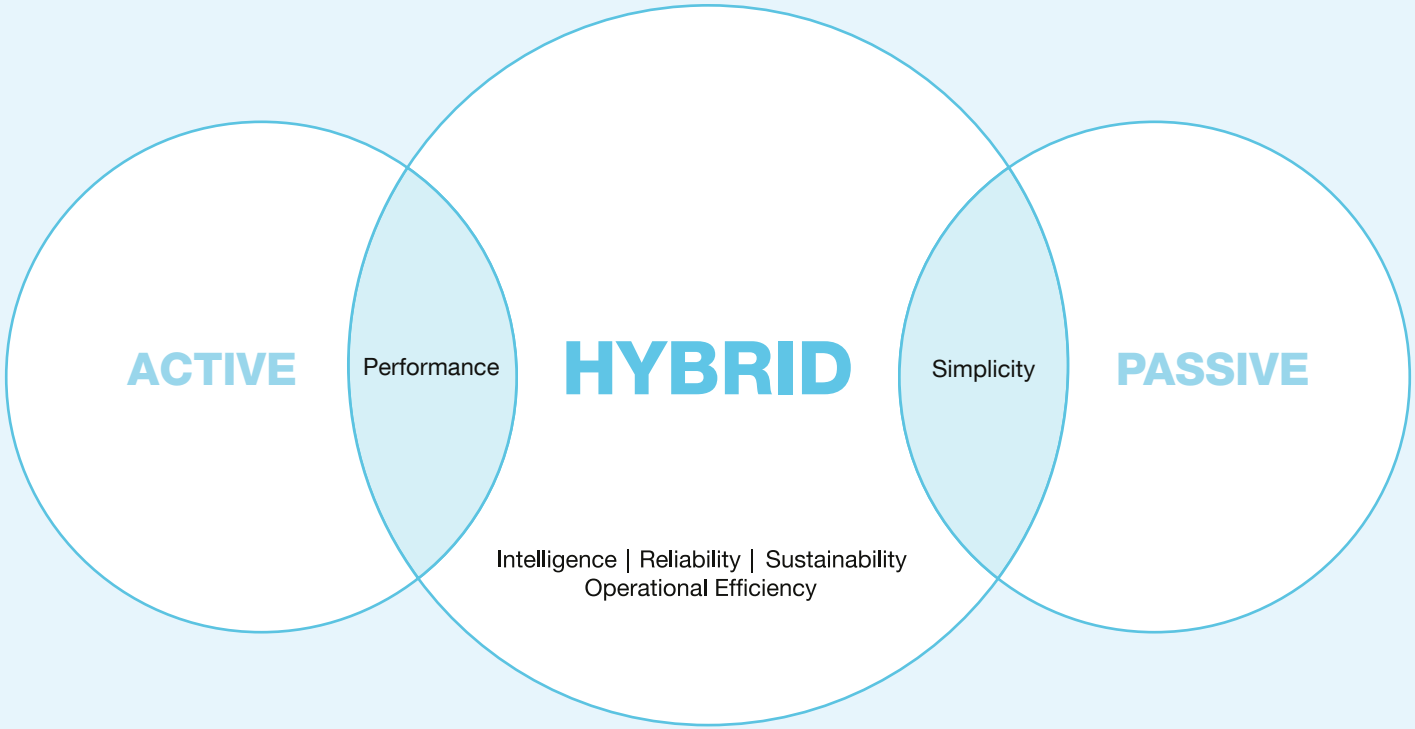


Fig 1.

In Figure 1, we can see that hybrid containers combine the best aspects of active and passive solutions (performance and simplicity, respectively), while solving many of the issues that modern pharma supply chains face.

Every shipment carries high-value, temperature-sensitive medicines that must arrive safely and compliantly. However, each choice of container (active, passive, or advanced passive) comes with its own set of issues. As a result, the industry continues to face recurring problems:

Performance

According to the IQVIA, over $35 billion worth of pharmaceutical products are lost every year due to temperature excursions. Active containers are expensive and rely on plugs and power for longer protection. Passive solutions are cheaper but often fall short during delays or in extreme climates.

Ease of use and efficiency

Active units usually demand charging, roller beds, and frequent manual checks, which slow operations. Passive solutions are simpler during transit, but often require intensive preparation, extra vehicles, or packaging (which increases the external volume and overall weight). In both cases, heavy logistics requirements drive up costs and resource use.

Intelligence

Once a shipment leaves the manufacturing facility, visibility drops. Many solutions rely on manual checks or external loggers, leaving pharma companies uncertain about where products are, or whether they will arrive with integrity intact. Lack of real-time data makes risk management reactive rather than proactive.

Sustainability

Pharma companies face mounting pressure to cut CO_2 and meet ESG commitments. Yet active units consume significant energy and have to return by air, while many passive units are single-use and end up as waste. With the rising cost of carbon offsetting, these approaches are unsustainable — both environmentally and financially.

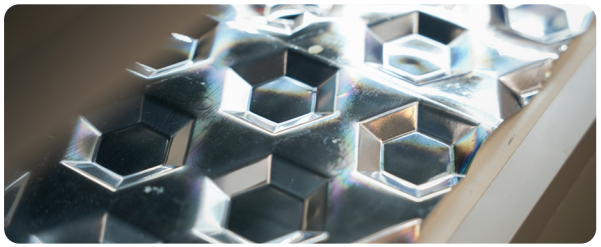
KEY TAKEAWAYS

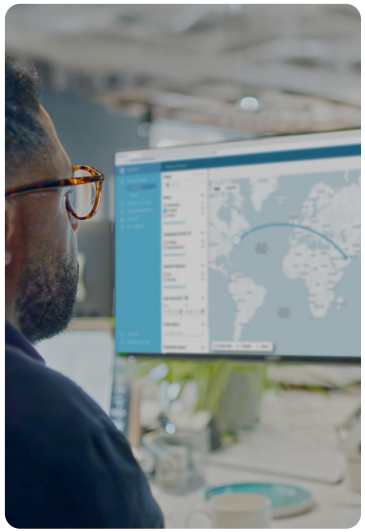
Pharma companies are often forced to choose reliable protection at a higher cost or cheaper solutions that increase emissions and risk. The industry needed a new standard that doesn't compromise.

Chapter 4

How Hybrid Works

Complete pharmaceutical protection





Hybrid containers were designed to overcome these challenges, being a complete pharmaceutical protection system — not just a box.

- **Built to Perform**
  At the core of every hybrid is our proprietary insulation material and heat distribution technology. Together, they keep medicines within safe ranges for 11+ days without plugs or power, maintaining uninterrupted protection in even the harshest conditions.

- **Designed for Efficiency**
  Hybrids are lightweight, space-efficient, and multimodal, moving seamlessly across air, sea, and road to enable true door-to-door transport and an unbroken supply chain. Without an optimized weigh-to-volume ratio, they cut costs and complexity while carrying more medicine per load.

- **Intelligent & Sustainable**
  With built-in IoT sensors connected to our predictive monitoring system, pharma companies and logistics providers gain real-time visibility and predictive risk alerts instead of uncertainty. And because hybrids are reusable, repairable, and part of a circular model, they cut lifecycle CO_2 emissions by up to 50%.

Chapter 5

Hybrid vs Active vs Passive

Performance, Cost-Efficiency, and Sustainability Built In

Read the complete Hybrid vs Active analysis

Features	Temperature Range & Control	Lane Suitability	Independent Runtime	Power Needs in Transit	Handling & Storage	Freight Efficiency	Visiblity & Data	Sustainability & Returns
Hybrid	Resilient in extremes; COL +2°C to +8°C and CRT +15°C to +25°C	Door-to-door protection for lanes of any length or complexity	270 hours with ability self-re-charge in cold chain environments	None	Preconditioned; no roller beds or special storage/equipment required	379 kg tare; 4× per PMC; 1× EU/US pallet, 22 per 53-ft US truck, 18 per EU truck	Built-in IoT with digital twin software and predictive analytics	50% lower CO_2 than passive solutions[1], circular design, ocean returns
Active	Wide range, but power-depend-ent; less reliable in extremes	Often used on lanes with reliable power infrastructure	Limited by battery/ power (e.g., ~ 30-90 hours for some units)	Plugs/batteries required	Complex; plugs, roller beds, special forklifts sometimes needed	635–1,150 kg tare; 4–7 per US/EU truck	Integrated loggers	Air returns result in higher CO_2 from air returns
Passive	Performance is highly ambient-dependent	Only suitable for short journeys	Condition-dependent, low in extremes	None	Preparation before transit and cold chain environments required	Some are lighter but bulky, others heavier with lower volume	External loggers or manual checks	High waste foot-print, single use

[1] According to myclimate

Chapter 6

The Future is Hybrid

Logistics without the Trade-offs

When we developed our containers, our goal was simple: how can we achieve zero product loss for our customers?

We created the hybrid container to combine the best of active systems (a long runtime and the ability to recharge), with the simplicity and reliability of passive design. It requires no manual intervention, offers superior weight and handling, and integrates sustainability by design.

Our smart container architecture brings together LoRa, Bluetooth, and GSM sensors to manage preconditioning, quality control, and real-time intervention. It's a system built on Swiss reliability and precision engineering.

Richard Ettl,
CEO at SkyCell

Demand for reliable global distribution is rising while risk and the pressure to cut cost and emissions intensifies. Active and passive solutions force trade-offs all along the supply chain. Hybrid eliminates them.

- **Resilient Supply Chains**
  <0.05% excursion rate; 270+ hours runtime; recharges in cold chain environments.

- **Lower Emissions**
  Up to 50% lifecycle CO_2 savings; Net ZERO Reverse cuts return CO_2 by over 90%.

- **Simplified Operations**
  No plugs, fewer steps, streamlined customs, faster changeovers, and reduced risk of human errors.

- **Future-Proof**
  Integrated data and predictive analytics for strategic planning, improvement, proactive QA, and automated compliance.

Get in touch

Let's make every shipment safer, more secure, and more sustainable. Contact us at **sales@skycell.ch**

SKYCELL

SkyCell is a Swiss supply chain technology company on a mission to eliminate medicine loss and drive net-zero emissions in pharma logistics.

Founded in 2012 and trusted by the top 20 pharma companies, SkyCell combines hybrid containers, smart software, and tailored services to enable safe, secure, and sustainable pharmaceutical transport.

Its end-to-end offering includes hybrid pharma containers, AI-powered pharma monitoring, and global Unit Load Device (ULD) tracking, with over 5 million shipments monitored annually.

With gateway infrastructure in 255+ airports and integrations with systems like Microsoft Teams and Validaide, SkyCell ensures unmatched visibility and control across the supply chain. Recognized among the top 1% of sustainable companies globally, SkyCell helps pharma companies, airlines, and logistics providers reduce risk, cost, and emissions.

The Sky is the Limit

Our trusted airline partners

AirEuropa
AIRFRANCE KLM Martinair CARGO
ANA
CATHAY PACIFIC
cargolux
DELTA CARGO
Emirates SkyCargo
ETIHAD CARGO
IAG Cargo
ITA AIRWAYS
JAPAN AIRLINES
KOREAN AIR CARGO
LATAM CARGO
LOT CARGO
QATAR AIRWAYS CARGO
Saudia Cargo
SINGAPORE AIRLINES
UNITED Cargo
virgin atlantic cargo