

Smarter technology for all

Reimagining Sustainability *Packaging*

eBook developed by Lenovo ISG



Lenovo

ISG Sustainability Value Statement

Lenovo is committed to supporting our **customers' efforts to reduce their environmental footprint**. Our sustainability thinking begins in the early stages of product design. From providing customers with innovative, **energy-saving** components like **liquid cooling** and **energy control software** to **decreasing packaging waste**, on to reusing essential elements via **closed loop post consumer content**, sustainability is a factor from acquisition to disposal. Environmental impact is a vital business criteria and Lenovo is dedicated to leading in the development of technologies that **minimize the use of precious resources**, like water, to **build a more sustainable future**.

Packaging is more than just a way to safely ship our server products from our manufacturing facilities to customers' sites. It's used to protect IT infrastructure in storage facilities as it awaits shipment to our customers. It's also an opportunity for Lenovo's innovative packaging engineers and designers to reduce the environmental impact of packaging waste and logistics operations.

This eBook covers Lenovo ISG's packaging and shipping initiatives. From the composition of the materials themselves to the method used to reduce the need for packaging overall, we get products to customer sites **smarter**.

Packaging and shipping initiatives



For more information, contact your Lenovo sales representative.

A photograph of a bamboo forest with a path and light trails. The path is a narrow, dirt road that curves through the forest. The bamboo stalks are tall and green, creating a dense canopy. The path is flanked by dry, brown grass. Two bright, glowing orange-red light trails curve along the path, suggesting a long-exposure photograph of a light source moving through the forest.

Rethinking Packaging

Protecting the IT and the Environment

Lenovo

Did you know?

Lenovo...

- Eliminated over 3,100 tons (2,800+ tonnes) of packaging consumption by weight since 2008.
- Began using 100% recycled and recyclable packaging materials over 10 years ago.
- Requires our suppliers meet a number of environmental specifications for packaging.
- Uses bio-based packaging made from bamboo and sugar cane fiber.
 - 98% of ThinkPad products now use recycled cushioning material, with the printing on boxes done via flexography with water-based, non-toxic inks.

The bottom line...

- Packaging is more than just an afterthought. Lenovo has a team of engineers dedicated to improving our packaging strategy and initiatives.



Introduction

Packaging

It's clear; packaging materials are critical to ensuring that products remain intact and safe during storage and shipment from one place to another. At Lenovo, packaging is more than just an afterthought. We strive to ship our products **smarter**.

From using bio-based packaging materials to designing lighter pallets to reducing the use of packaging tape, Lenovo is resolute in its aim to reduce the environmental impacts of its packaging. This can be seen through many initiatives, including:

- Greener, lighter packaging
- Bulk and reusable packaging solutions
- All suppliers are also held to our elevated environmental standards

Our packaging components such as corrugated cardboard, high-recycled content (HRC) cushion, and ocean bound plastic (OBP) bags not only contain recycled materials, but they are also **100% recyclable** themselves. When these materials are used and the products they were designed to protect arrive intact to customers' data centers, they don't have to be trashed. Instead, they can be recycled once again and given a new purpose. But here's where smarter really comes into play – by employing our game changing **rack integration shipping method** (read on to learn more about this), we have further reduced the need to use massive amounts packaging materials.





Many Lenovo customers have opted for their server racks to arrive at their data center sites fully loaded with the nodes and all the components. This method, called **rack integration**, saves customers installation time and speeds the time to production. For example, it can take up to four days to unpack and build three server racks. Integrated racks are tested in Lenovo's manufacturing facilities to detect system issues before arriving at the customer's data center. Additionally, the ability to install fully loaded and tested racks with limited on-site personnel during the COVID-19 pandemic allowed Lenovo to continue to deliver critical IT infrastructure to our customers.

In addition to the improved time to deployment and quality assurance measures, there is the environmental impact stemming from the **reduction of packaging waste**. When servers are pre-installed and shipped in the rack versus individually packaged server nodes, chassis, and racks, the amount of individual boxes of cardboard, foam, plastic and paper is reduced.

Lenovo is also introducing the use of **ocean bound plastic (OBP)** in the packaging of server products. OBP is derived from **abandoned plastic waste**, such as milk jugs, shopping bags, and laundry detergent bottles, that are at risk of ending up the ocean. Select Lenovo servers are packaged in a bag that is **composed of 30% OBP material**. Lenovo ISG is leading the way in using high recycled content (HRC), or material composed of at least 65% pre-consumer recycled content, in its packaging. By the end of 2021, over 2,500 tons (2,300 tonnes) of HRC was used, reducing CO2 emissions by nearly 2,700 tons (2,500 tonnes).

Ocean Bound Plastic (OBP)

OBP is derived from abandoned plastic waste, such as milk jugs, shopping bags, and laundry detergent bottles, that is at risk of ending up the ocean.



The problem: plastic waste has a major impact on the ocean.

More than 5 trillion plastic pieces weighing over 250,000 tons (227,000 tonnes) is afloat at sea*

- From 1950 to present, the total global production of plastic is 8.3 billion tons (7.5 billion tonnes).
 - 5.7 billion tons (5.2 billion tonnes) has not been recycled and is discarded in the ocean at a rate of 8 million tons (7.3 billion tonnes) per year.
- Some of the plastic garbage flowing into the ocean directly harms the life of marine animals. It is estimated that marine waste kills one million marine animals each year, endangering the ecological chain of nearly 700 species.
- Marine plastic waste contains toxins which cause damage to animal organs or cause cancer and other serious harm. Some marine animals that eat the plastic are being eaten by humans as seafood, which also endangers human health.

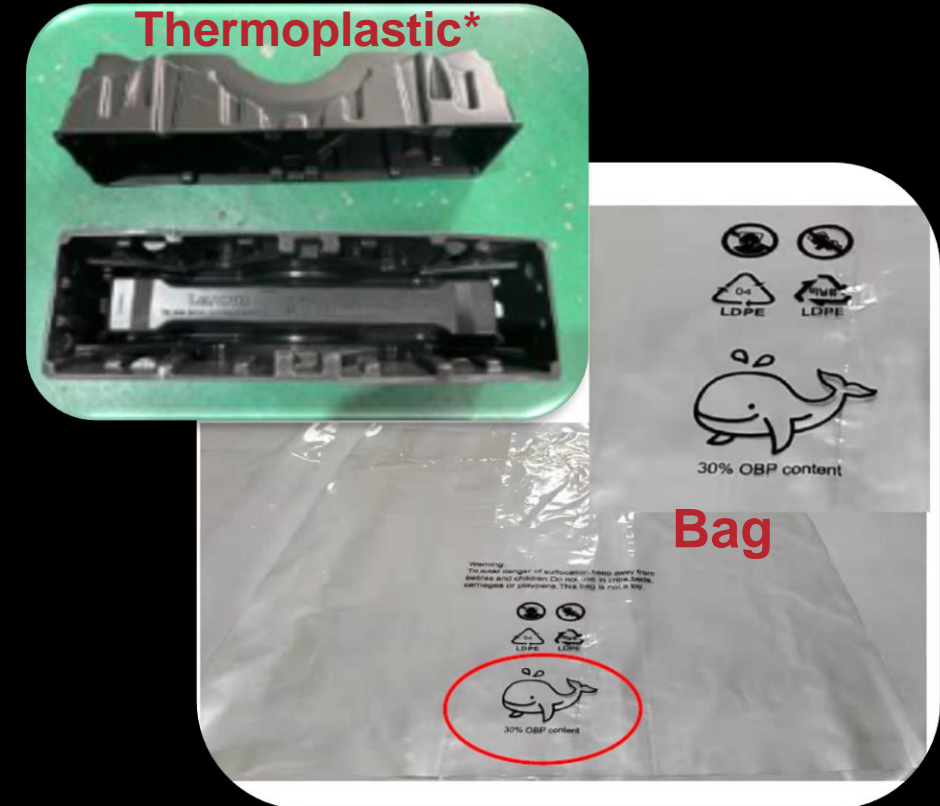


Our solution: use ocean bound plastic in current and future generations of product packaging

But how is OBP created?



Lenovo applications
of OBP

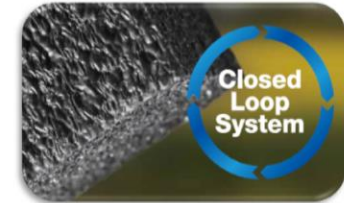


30% ocean bound plastic + 68%
plastic + 2% additive

Our solution: Lenovo uses and will expand the use of OBP in our server packaging.

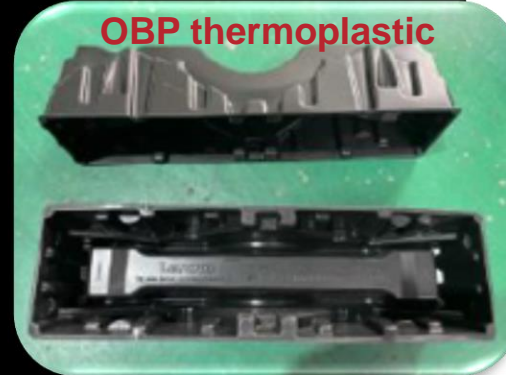
We are systematically increasing the use of OBP in our packaging materials. Plastic bags and foam packaging are used to protect the hardware during shipment. As Lenovo introduces OBP into our shipping processes, these new plastic bags will be composed of 30% of OBP material. Additionally, we are leading the way in using high recycled content (HRC), or material composed of at least 65% pre-consumer recycled content, in our foam packaging.

Recycled Foam for Server Packing

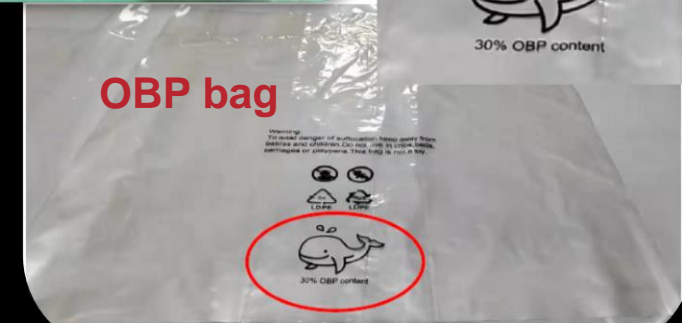


High Recycled Content (HRC) contains a minimum of 65% recycled resin content, MRC recycled content beyond 90%. Recycled materials are recovered from the downstream

OBP thermoplastic



OBP bag



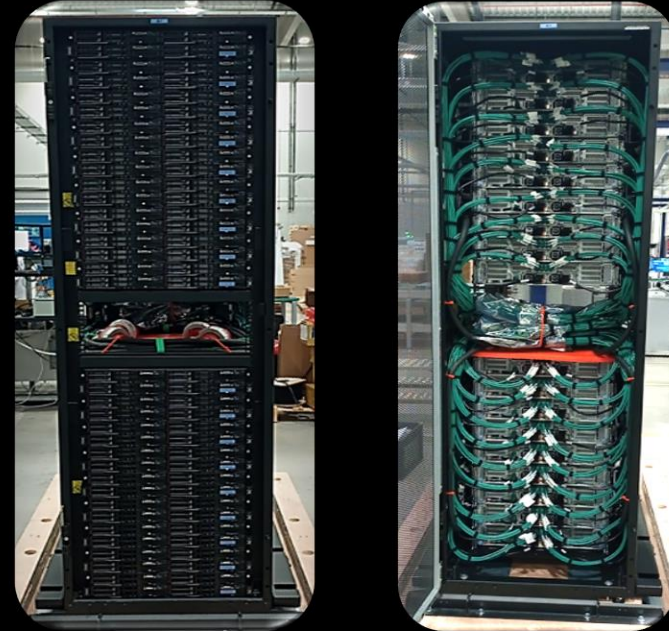
Rack Integration

Server racks arrive at customer data centers fully configured and ready to run.



The challenge: shipping IT equipment safely can require a lot of packaging

Most Lenovo systems are housed in a rack.



The typical rack can house between 18 and 72 servers. A rack of 36 1U servers can use:

- 105 pounds (48 kilograms) of cardboard
- 54.6 ft³ (2 cubic meters) of foam
- 288 linear feet (88 linear meters) of wood
- 21,730 less paper inserts [12 pounds (5 kilograms)]



Multiply the packaging by thousands of servers and you get:



Our solution: consolidate and bundle IT equipment into server racks

Rack integration: the *secret* sustainability asset

Percent of Lenovo servers
shipped in rack

30%

2021/2022 Results
Up from 24% in 2020/2021

SAVES

105 lbs. (48 kg) of cardboard¹
54.6 ft³ (2 cubic ft.) of foam
288 linear feet (88 linear meters) of wood
21,730 less paper inserts [12 lbs.(5 kg)]

¹Per Rack

of servers shipped in rack

373K

5.4M trees saved
1.85M lbs. (84,000 kg) of plastics
20K miles (32,000 km) of wood from pallets

Additional Customer Benefits

Integrated Racks

75%

Faster time from arrival to
production readiness

Number of POs and parts to track
for your operations teams

1

Improved Quality

Factory rack level testing
Lower commodity failure rates
Less personnel required to install

Integrated racking reduces impact on our environment.

Packaging by the numbers

373K
Servers shipped in rack
(since FY20/21)



**3.5M lbs.
(1.6M kg)**
Cardboard saved
by shipping in-rack*

**107M linear ft.
(33M linear m.)**
Wood pallets saved*

**4.5M lbs.
(2M kg)**
Paper from instruction inserts saved*

**1.8M
(816K kg)**
Plastic saved
by shipping in-rack*

5.4M
Trees saved*

=

**32K acres
(13K hectares)**
Forest land*

**180 tons
(163 tonnes)**
CO2 emissions reduced*

Rack integration: the hidden gem

Lenovo has proven capability for full rack integration within our own manufacturing sites around the globe. As the complexity in the data center grows, the time to production becomes more critical. Lenovo will:

1. Assemble and rack all components (servers, switches, PDUs, cables, etc.). On average, this can take 9.5 hours to complete at a customer's data center.
2. Customize servers according to each customers' specifications (UEFI settings, VLANs, etc.).
3. Test all components before they arrive fully racked to customer sites. Factory-level testing prevents the need to accommodate travel arrangements to send service personnel onsite. This further reduces our environmental impact.

Each server is moved from the manufacturing line straight into the rack, so there is no need for packaging or shipment for each individual rack.



Rack integration manufacturing workflow step-by-step

Design

- Expert teams **design price performing solutions**
- Internal experts review designs to **ensure workability**
- Multiple teams **vet overall viability of solution** and work through iterations with customer

Build

- MFG layout and documentation **speeds client set up**
- **Customer labeling and naming schemes** can be applied
- xClarity Controller programmed

Test

- All systems, networking and storage is **powered on and configured with best recipe FW**
- Linpack is used to **stress system** and introduce thermal conditions
- **Failed parts are fixed** in MFG and systems retested

Deploy

- **Racks delivered inside at no extra charge**
- Data tables for Confluent are shipped with each rack for ease of system identification and setup
- Server racks layouts, VPD, MAC addresses can be pre-shipped to customer

Onboard

- By performing due-diligence and system assurance up front, systems **are onboarded and pass into production quickly**

Lenovo is a global leader in supply and logistics.

In addition to our packaging and shipment strategic approaches, Lenovo has been recognized for sustainably leading the way in our logistics and supply operations.

View each for more details.

- [Green Freight Asia](#): Lenovo is the first shipper in the world accredited with 4 leaves for Australia in 2022, and the first shipper in the world accredited 3 leaves for China in 2020
- [Global Logistics Emission Council \(GLEC\)](#): Lenovo is the first Chinese shipper who implemented the GLEC framework for worldwide logistics emissions calculations
- [Sustainable Aviation Fuel \(SAF\)](#): Lenovo is the first Chinese shipper that implemented the SAF program from China to Europe (for PC products) in December 2021
- [Gartner® Global Supply Chain Top 25 for 2022](#): Lenovo ranks #9
- [CDP Supplier Engagement Leader](#): acknowledging our efforts to measure and limit greenhouse gas emissions throughout our supply chain
- [US EPA SmartWay Partner](#): program helps companies advance supply chain sustainability by measuring, benchmarking, and improving freight transportation efficiency.



Packaging FAQs

Does Lenovo have rack integration in many locations worldwide?

Yes, Guadalajara (Mexico), Whitsett (US), Ullo (Hungary) and Shenzhen (CN) as well as country-specific such as India and Brazil, are capable of rack integration.

How do I move from box level to rack level shipment?

Need more than one server? Enlist the help of the Lenovo Engineering and Technical Support (LETS) team to help with the rack integration. <http://lets.lenovo.com>

What if I already have a standard rack in my data center – are their options for me?

We can and have sent non-Lenovo racks from our factories fully configured but as each rack is different and shipping capabilities vary widely, it is important to discuss possibilities for non-Lenovo rack support.

Does it take longer to build racks then to receive the individual boxes?

No. For example, it can take at least three days to unpack and build racks for 200 nodes, chassis, etc. on the customer's site. With rack integration, it can take roughly ¼ a day to unpack the fully loaded racks.

If my business partner normally configures my systems is there any thing I need to know?

No, your business partner has direct access to the Lenovo configuration tools (x-config and DSCS) which provide rack integration support. Additionally, our Lenovo LETS team is set up to help our business partners with their technical needs.

Smarter designs out waste

- To keep IT safe during shipment and storage, we use smartly designed packaging that protects both the systems and the environment.
 - Use of OBP bags and thermoplastics help clean our oceans
 - Rack integration has saved 3.5 million pounds (1.6 million kilograms) of cardboard, 107 million linear feet (33 million meters) of wood and 4.5 million pounds (2 million kilograms) of paper from instruction inserts.
 - Lenovo packaging materials including cardboard, cushion and OBP bags are 100% recyclable.
- Rack integration from the factory saves time, money and offers higher quality products plus, has significant environmental benefits:
 - For every rack that ships configured we save approximately:
 - 105 pounds (48 kilograms) of cardboard
 - 54.6 ft³ (2 cubic meters) of foam
 - 288 linear feet (88 linear meters) of wood
 - 21,730 less paper inserts [12 pounds (5 kilograms)]
- In the past two years, shipping integrated racks has saved 32,000 acres (13,000 hectares) of forest land.

The Lenovo logo is displayed in white text on a red rectangular background.A photograph of a wind farm at sunset. The sky is filled with soft, orange and pink clouds. Several wind turbines are visible in the distance, their silhouettes reflected in a calm body of water in the foreground.

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**Want to learn more about sustainability?
Ask about our CO₂ Offset Service.**



thanks.

For more information, contact your Lenovo sales representative.

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