



School of Packaging

B.S. degree



Master of Science



Doctor of Philosophy



Teaching/education: B.S.

- **Science and Math requirements for all students (15 credits)**

- General and Organic Chemistry
- Physics I and II (meets MSU ISP requirements)
- Calculus I and II
- Statistics
- Biology, Microbiology, or Food Safety

- **Core Curriculum requirements all students (32 credits)**

- Technical principles for packaging
- Materials (glass, plastic, paper and metals in packaging)
- Computer applications
- Packaging processes & systems
- Distribution dynamics
- Design and prototyping
- Life Cycle Analysis & Environmental impacts
- Economic Factors of Packaging

- Environmental issues
- Virtual Package Design
- Medical packaging
- Food packaging
- Automotive and Industrial Packaging
- Packaging laws and regulations

- **Business cognate (At least 12 credits)**

- Advertising
- Business Law
- Financial management
- Marketing
- Management skills
- Supply chain management
- Science and Math Requirements

PACKAGING ELECTIVES (at least 9 credits)

- Printing & Graphics
- RFID and Robotics

Research Interests

➤ ***Interactions with the consumer***

- Label performance and compliance
- Pharmaceutical and medical devices
- Communication
- Regulatory compliance and concerns
- Marketing with packaging system
- Virtual design of packaging systems

➤ ***Interactions with the product***

- Permeability of gases and vapor
- Active packaging
- Migration and scalping

• ➤ ***Interactions with the environment:***

- Sustainability concepts and methodology
- LCA, bio-degradability, recyclability, etc..
- Distribution performance
- Reusable packaging system analysis

➤ ***New packaging materials***

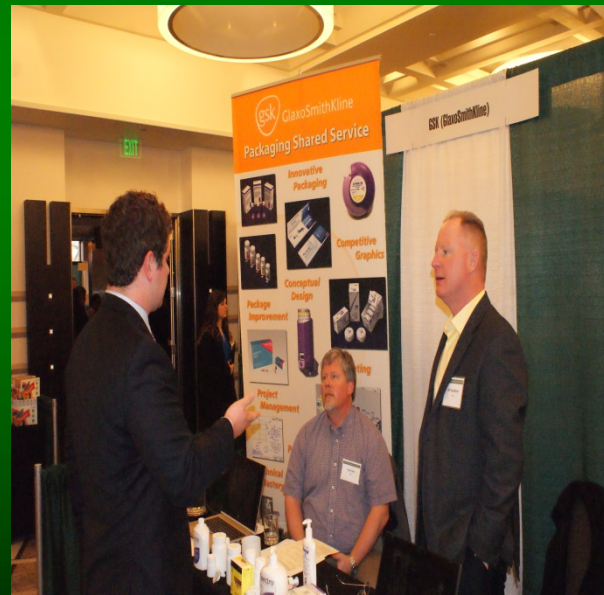
- Sustainable packaging materials
- New indicators for packaging sustainability
- Packaging system performance

➤ ***Packaging processes***

- Packaging logistics and supply chains
- Impact of packaging processes on the finished product's business plan
- Quality design as applied to packaging

➤ ***Logistics and Supply Chain (green)***

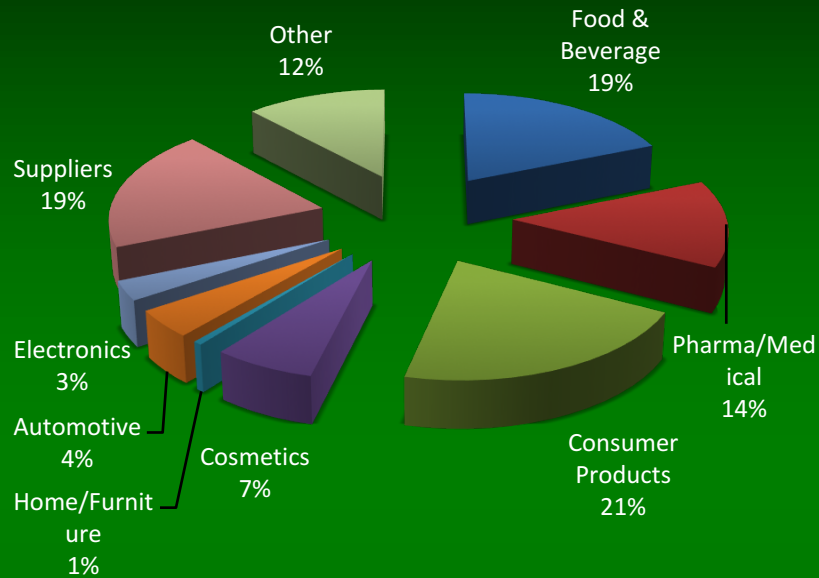
School of Packaging Career Fair January 28th & 29th 2015



PACKAGE COST GREATER THAN INGREDIENT COST

● BEER	510%
● PREPARED FOODS	214%
● CHEWING GUM	193%
● SOFT DRINKS	189%
● BREAKFAST CEREALS	164%
● SOUPS, BABY, OTHERS	147%
● FROZEN DINNERS	141%
● PET FOODS	122%
● DISTILLED SPIRITS	101%
● CANNED FRUITS & VEGETABLES	101%

Career Earnings



Food & Beverage	\$59,443
Pharma/Medical	\$52,575
Consumer Prod.	\$57,103
Cosmetics	\$52,210
Home/Furniture	\$52,000
Automotive	\$46,000
Electronics	\$57,250
Suppliers	\$46,954
Other	\$51,001

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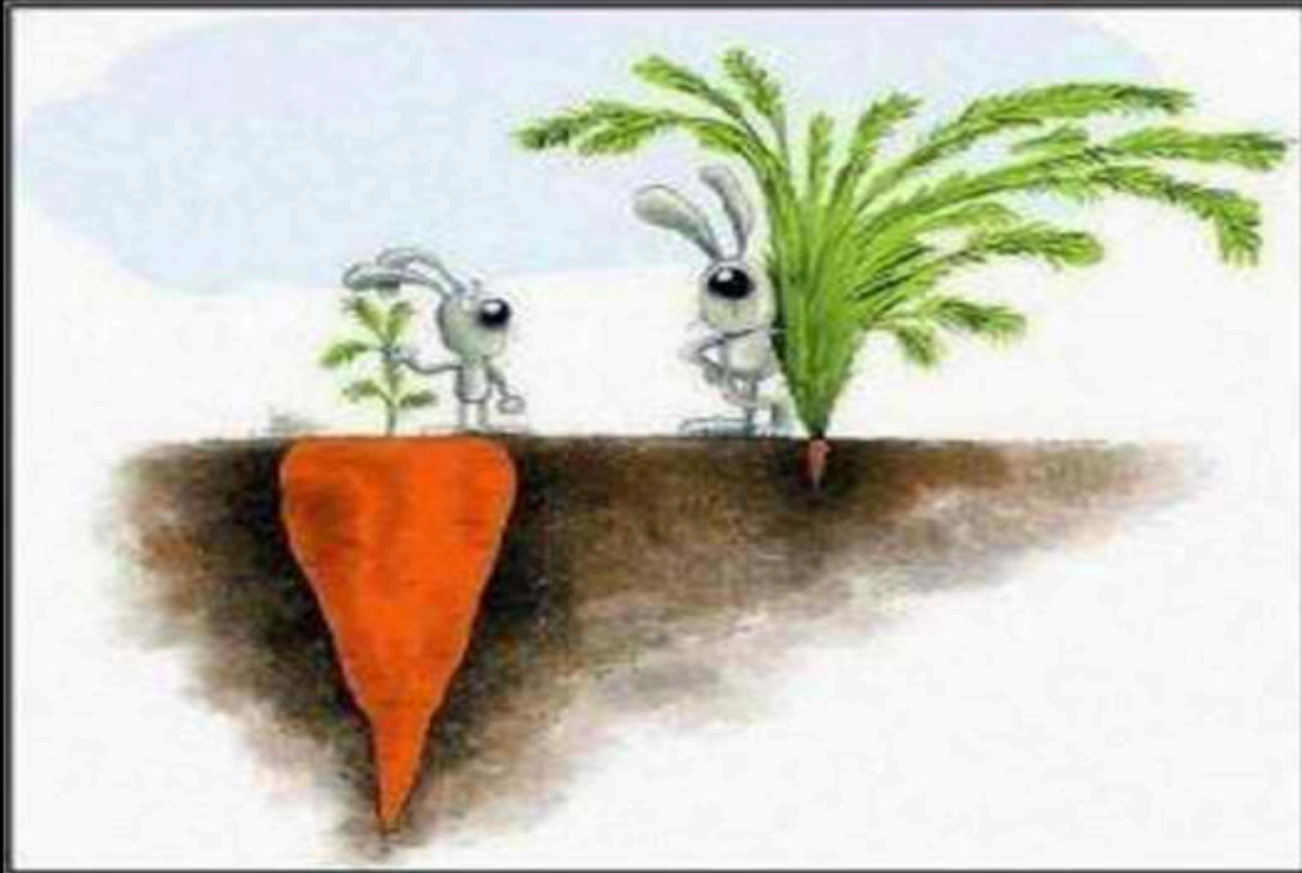
SECOND EDITION

CARTONS, CRATES *and* CORRUGATED BOARD

*Handbook of Paper
and Wood Packaging Technology*

DIANA TWEDE
SUSAN E. M. SELKE
DONATIEN-PASCAL KAMDEM
DAVID SHIRES





SUCCESS

It's not always what you see

Le bois m'emballe et toi?

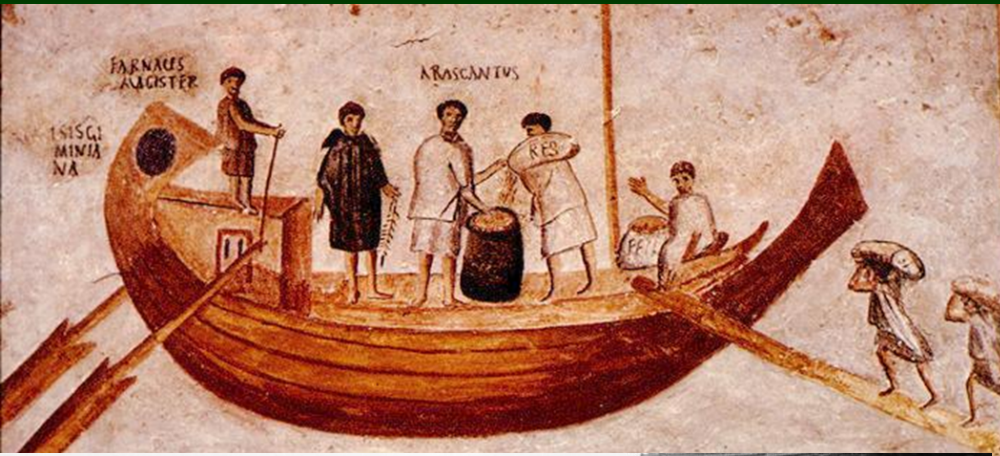


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2016 Packaging Innovation & Intelligent Manufacture Week
Ningbo China
Nov 1st to Nov 5th, 2016



Emballage



Emballages Bois

Emballages légers

- Cageots-barquettes... (primaires)

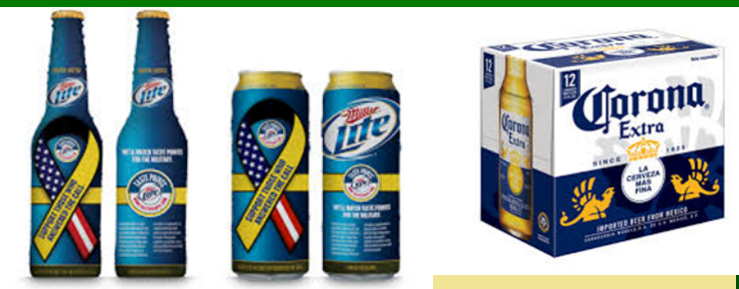
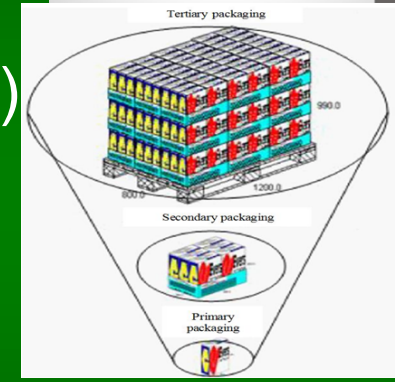
Emballages lourds

Transport/Distribution/logistique



Emballage

- Primaire
 - Contact direct avec le produit
- Secondaire
 - Protection-unite d'achat
- Tertiaire
 - Unite logistique (transport-distribution-stockage)

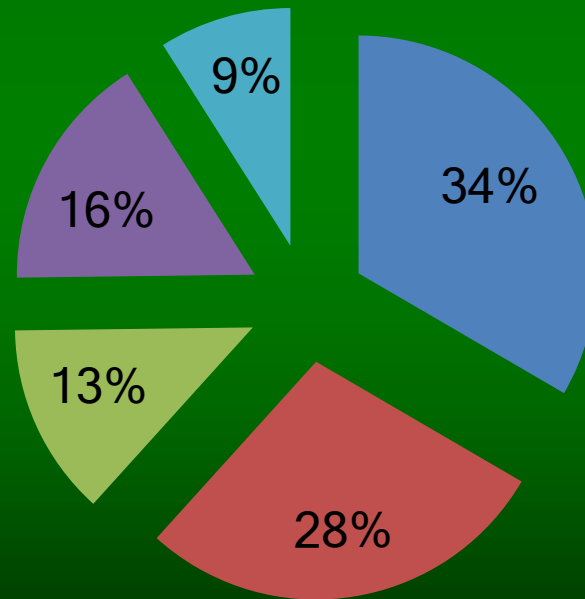


Emballage, France

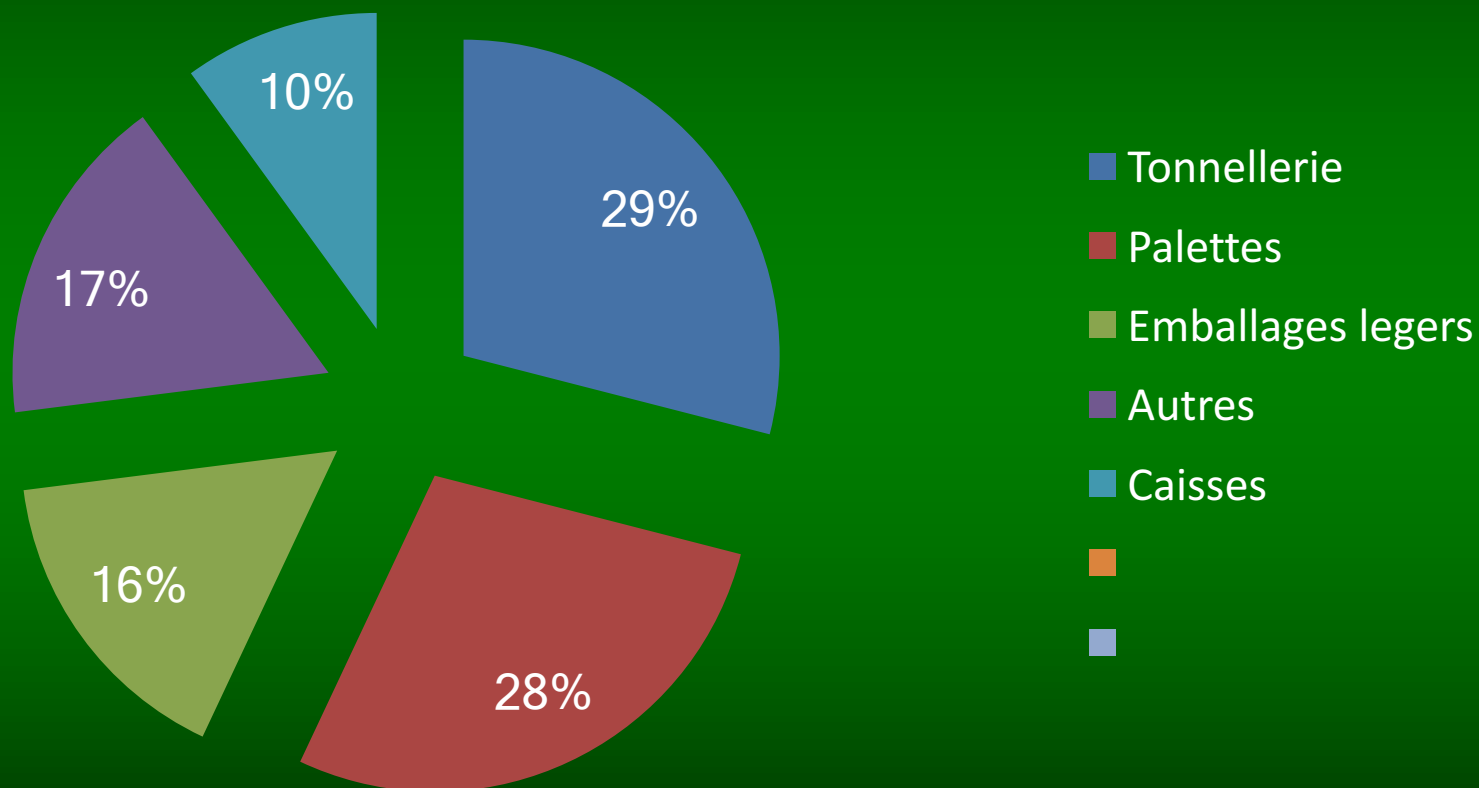
20 MMM euros (2006)

110M emplois

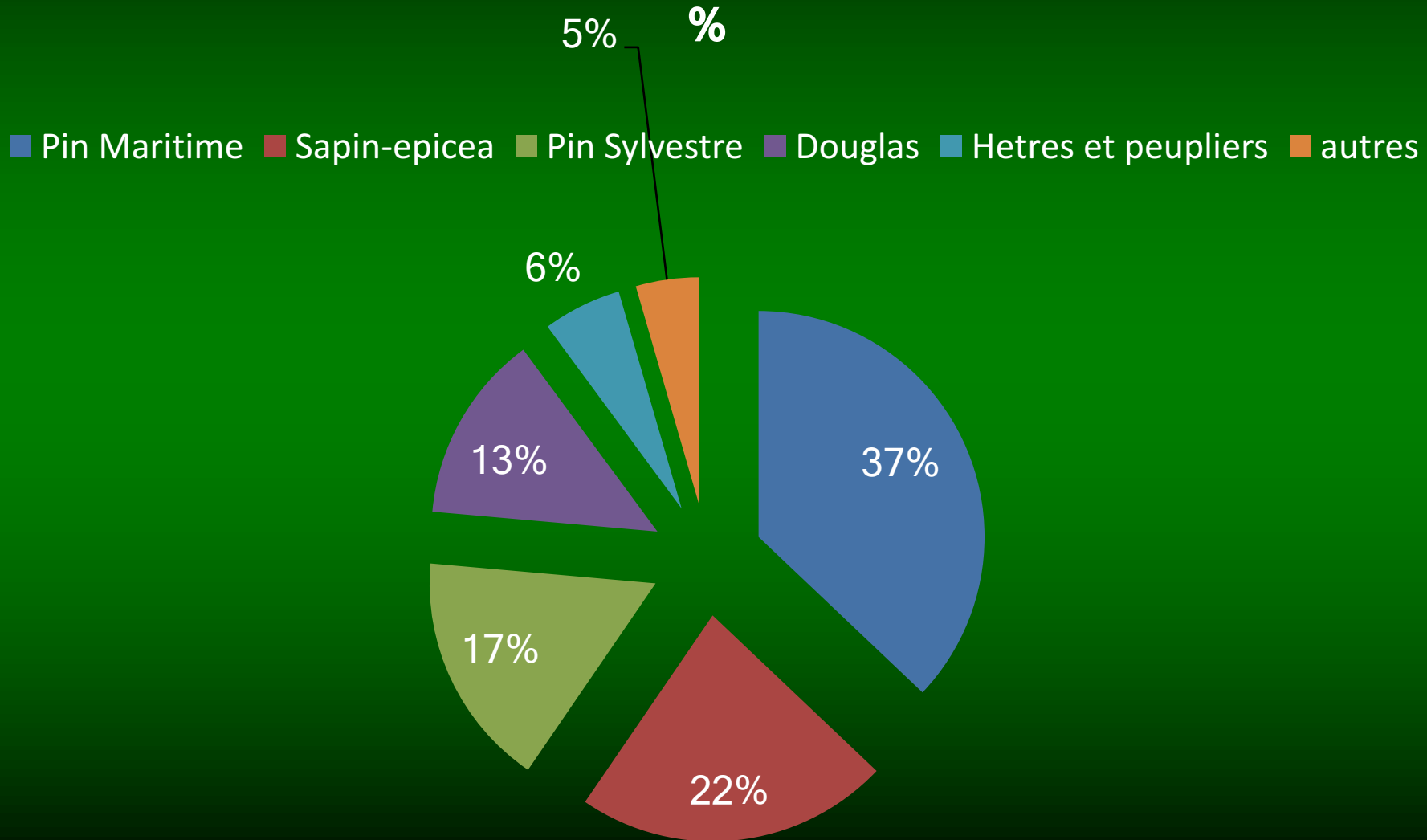
■ plastique ■ papier carton ■ metal ■ verre ■ bois



Emballage bois



Especies de bois





Warehouse- Storage



Pallet Types

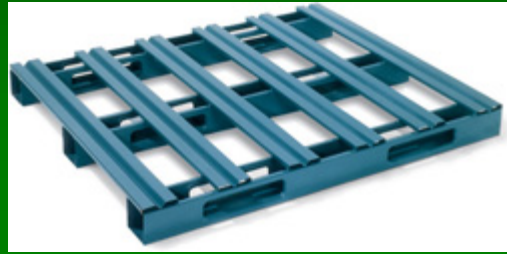
Wood:

most common
Approximately 30-42 lbs.
\$15 - \$25
Heat treated for export



Engineered wood products:

plywood for solid deck
particle board
Fiberboard



Thermoform Plastic

Metal:

aluminum
military for explosives



Corrugated:

light weight about 10 lbs,
good for one or two trips



Criteres de selection

- Densite
- Proprietes mecaniques
- Clouage
- fendillement
- Couleur
- Odeur
- Presence des extractibles et autres resins
- Cout (75 a 85% le prix)

Pallets-bois

- 2 billions wooden pallets in US yearly
 - New (400 millions)
 - Recycled (1.6 billion)
- About 12 billion dollar industry
- 95% : wood pallets

Problems

- Images (public perception)
- Structural Design
 - Especies de bois
 - Joint (Adhesion-Metal...)
- Durabilite
 - Duree de vie (4 a 5 ans)
 - Design
 - Metal
- Hygiene et biologique
 - Bacteries-Microbes-bleuissement-insectes..
- Reparation-Recyclage-Reutilisation

Defis

- Standardisation des palettes (Logistique...)
- Humidite
- Ecosystem Protection
- The ISPM15
 - Sans ecorce-56C-30minutes (export et import)
- Proprietes mecaniques
- Planches avec defauts
- Planches recycles
- Performance de la structure

Reusable-Recyclable-Upcyclable





Unit load

- Pallets: \$15-\$20
- Stabilisateurs: \$5
- Produits: 50-\$100,000
- Palette vs Produits?



Poids maximum?

- PDS



THE ECONOMICS OF CLIMATE CHANGE MITIGATION OPTIONS IN THE FOREST SECTOR

INTERNATIONAL ONLINE CONFERENCE | 6-27 FEBRUARY, 2015

Wood is good

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Food and Agriculture
Organization of the
United Nations

THE ECONOMICS OF CLIMATE CHANGE MITIGATION OPTIONS IN THE FOREST SECTOR

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Wooden pallets, barrels, crates, boxes, baskets and containers in Packaging Logistics: Benefits for climate change mitigation?

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Thank You!