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Active and intelligent fibre-based packaging: Outlook from a brand owners perspective

Cost Action FP1405

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Nestlé in Figures

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Nutrition & Healthcare
11%

Pet Care
12%

Confectionery
11%

Nestlé Waters
8%

Milk Products & Ice Cream
20%

Prep. Dishes & Cooking aids
16%

Powdered & Liquid Beverages
22%

Turnover 2014: CHF 91.6 billion

>330’000 employees in 150 countries

>440 factories in 86 countries

>2,000 brands

OVER 1 BILLION PRODUCTS SOLD EVERY DAY

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NRC Collaborates with Internal and External Partners to Translate Science into Innovation

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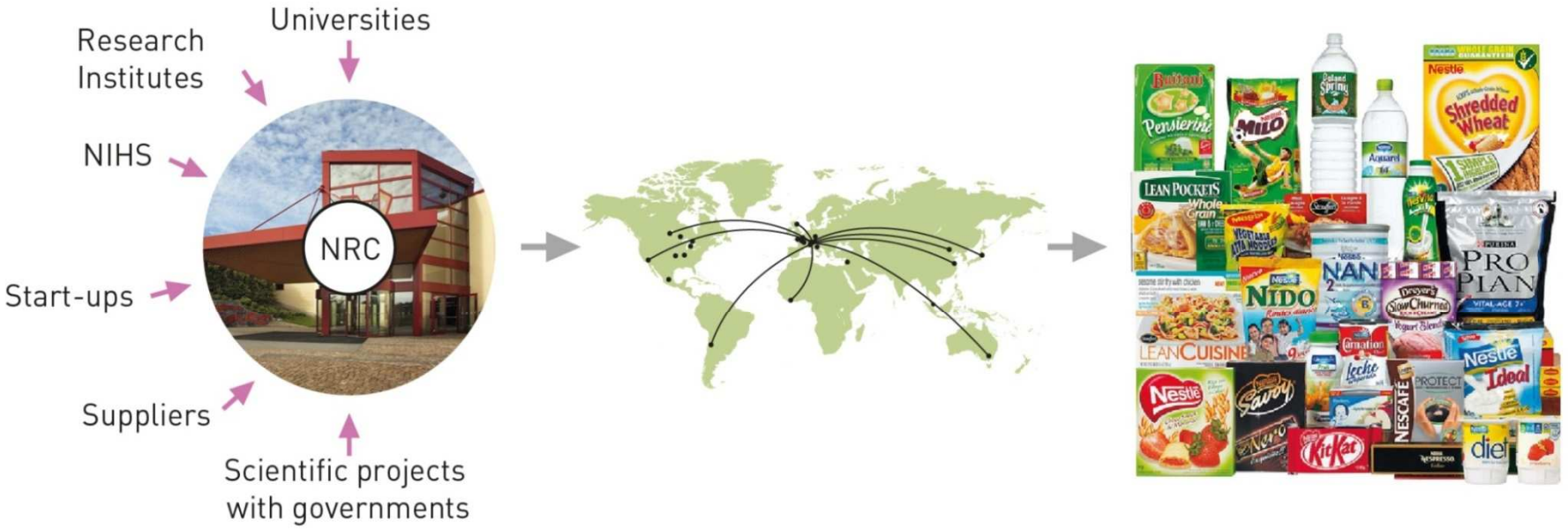

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Nestlé R&D Organisation
Organised for global scale & local relevance

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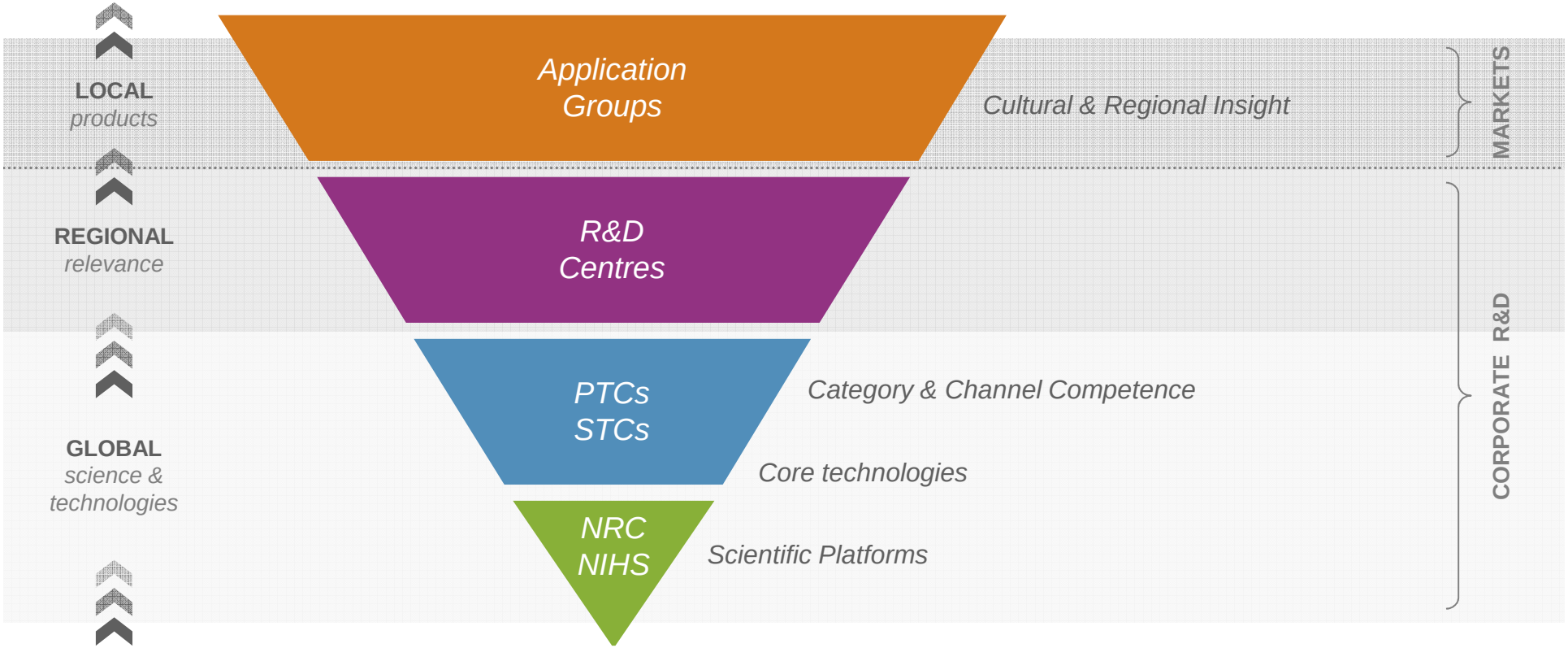

NRC Role & Responsibilities:

Leadership in Food & Nutrition Sciences

Knowledge transfer as a source of innovation

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Worldwide R&D footprint (2015)

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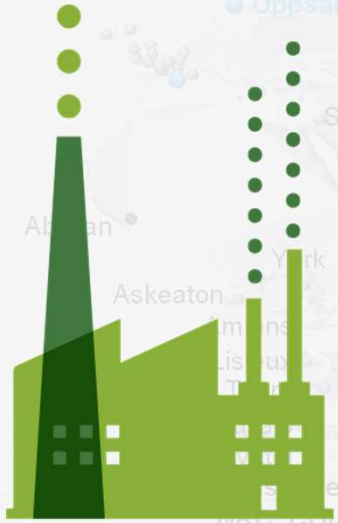
Research Centres
(NRC, NIHS)



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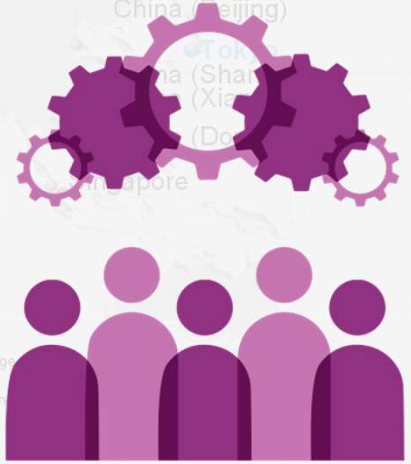
Product Technology and R&D Centres



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Application Groups

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Packaging at Nestlé

Ranking of major industrial contributors to EU environmental degradation

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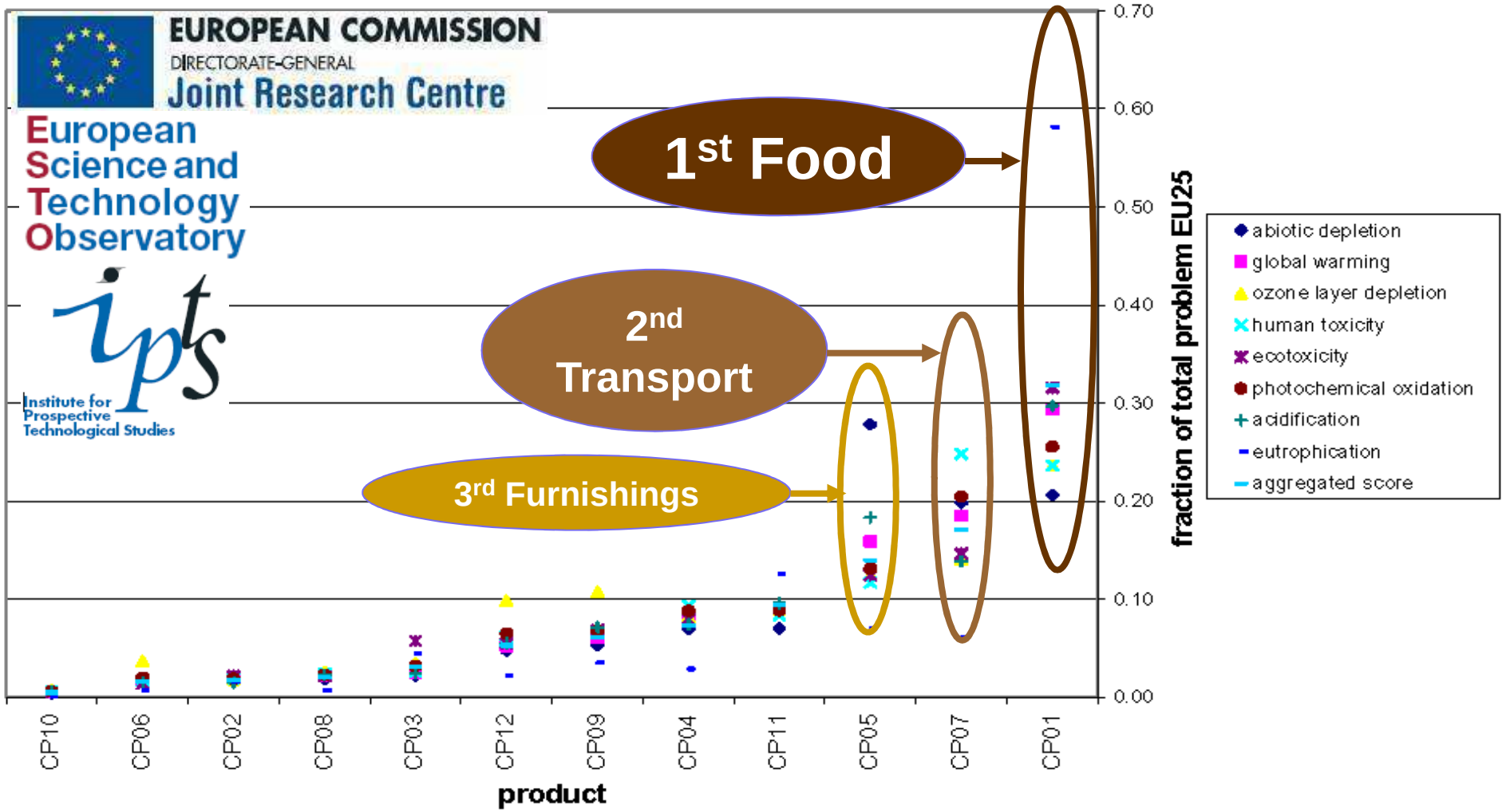

Source : Environmental Impact of Products (EIPRO) - 29.04.05 based on 7 existing studies & own analysis

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Packaging protects food and prevents waste

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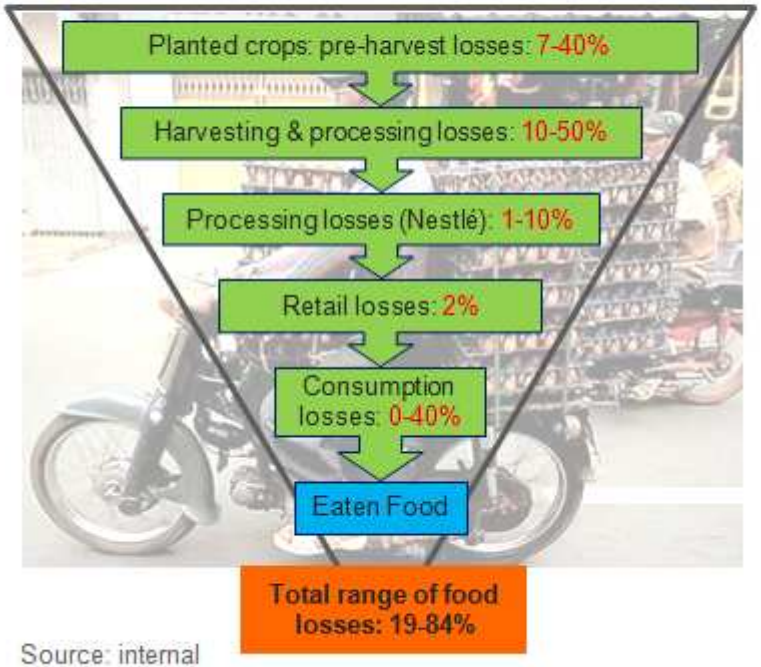
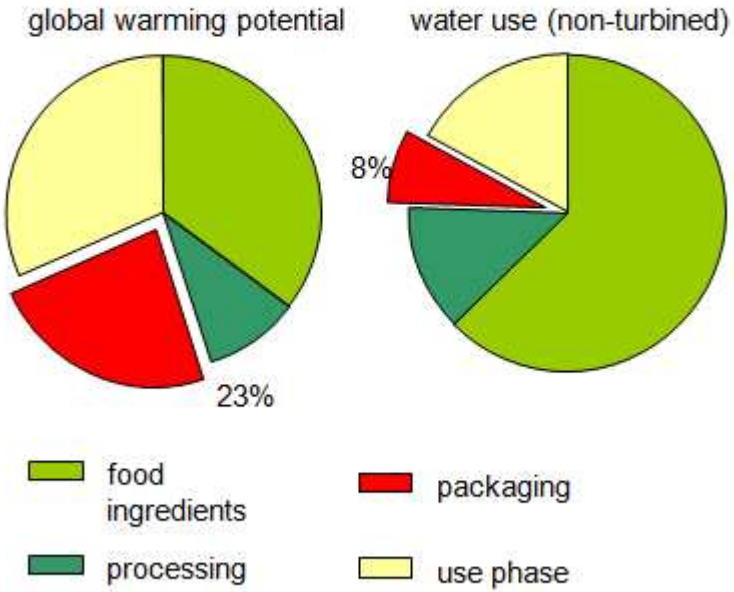
- Packaging serves to protect the food it contains



Source: internal Nestlé research

- Packaging only represent a small share of total impacts



Source: conservative estimate based on internal Nestlé screening LCA studies

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The Nestlé Policy on Environmental Sustainability

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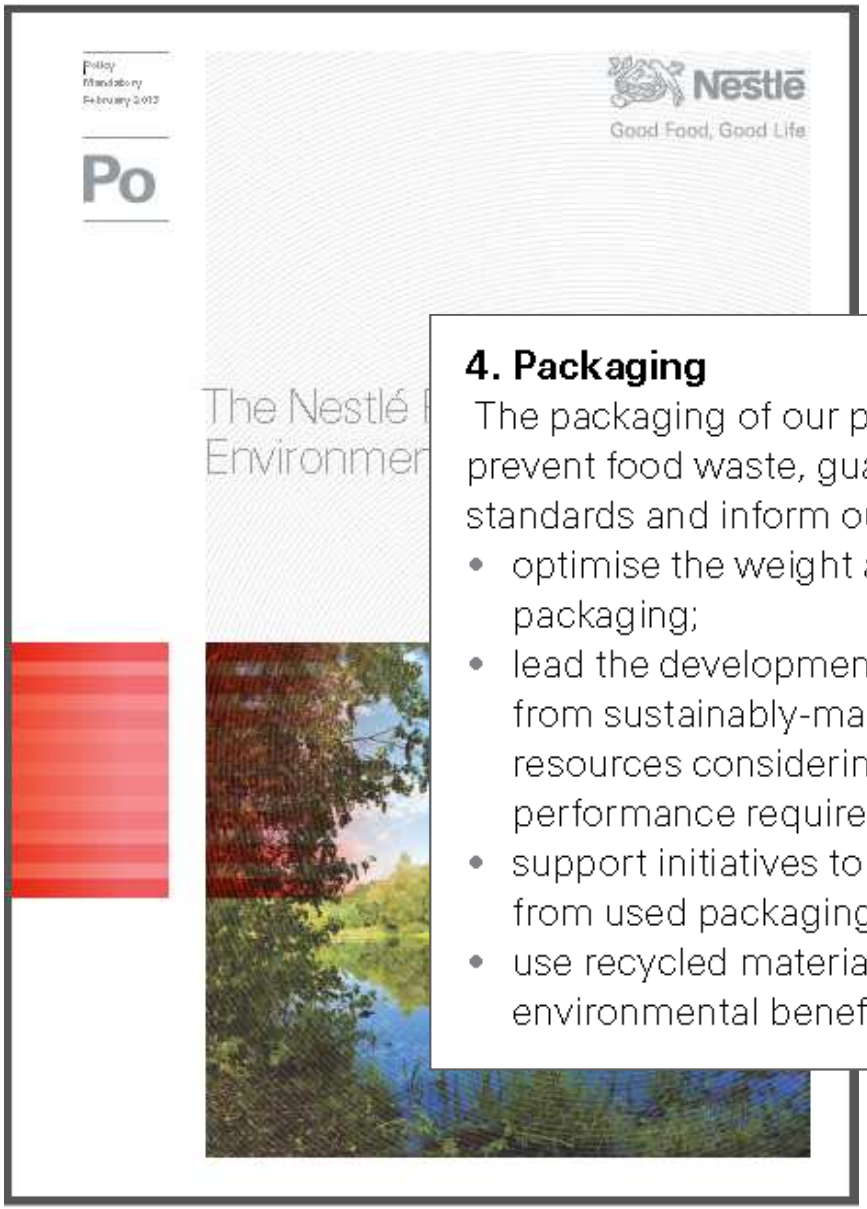

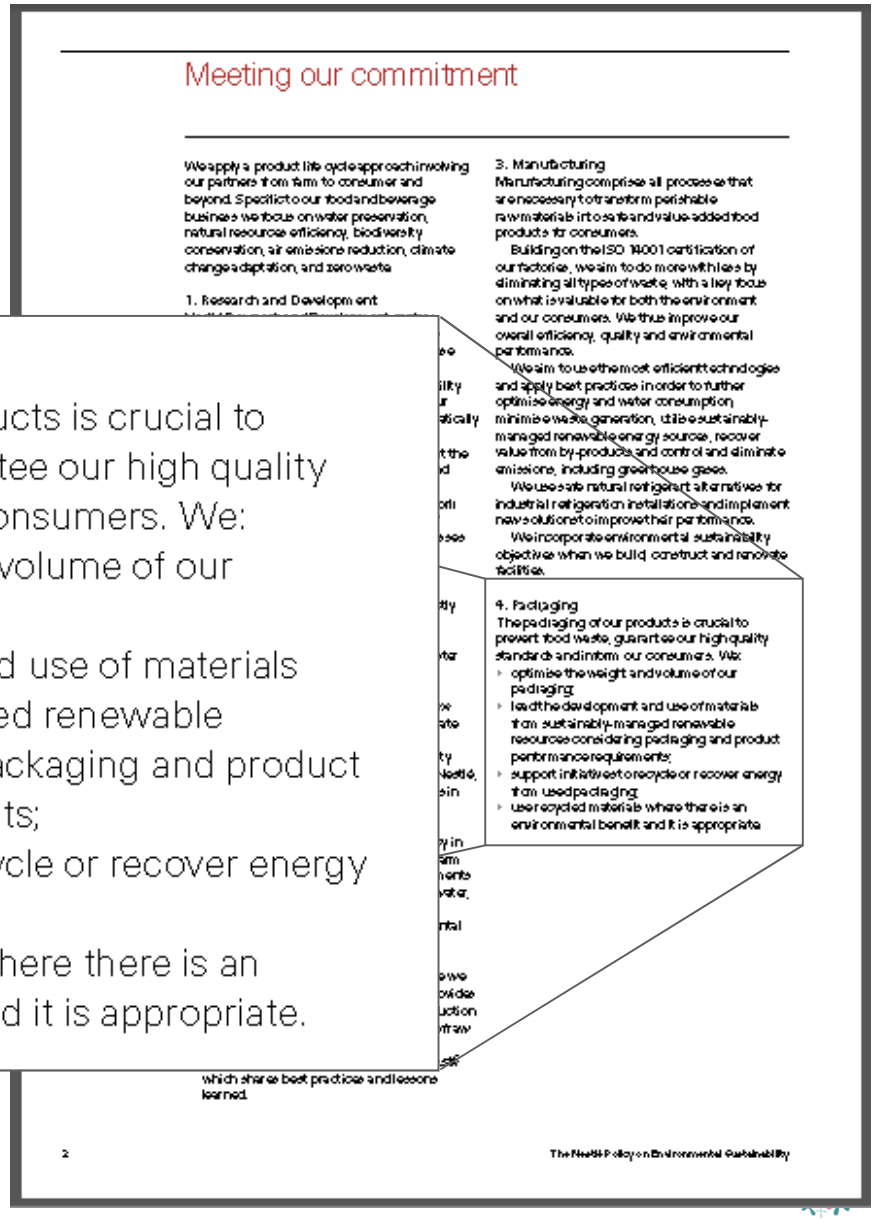

4. Packaging

The packaging of our products is crucial to prevent food waste, guarantee our high quality standards and inform our consumers. We:

- optimise the weight and volume of our packaging;
- lead the development and use of materials from sustainably-managed renewable resources considering packaging and product performance requirements;
- support initiatives to recycle or recover energy from used packaging;
- use recycled materials where there is an environmental benefit and it is appropriate.

Continue Optimization of Packaging Systems

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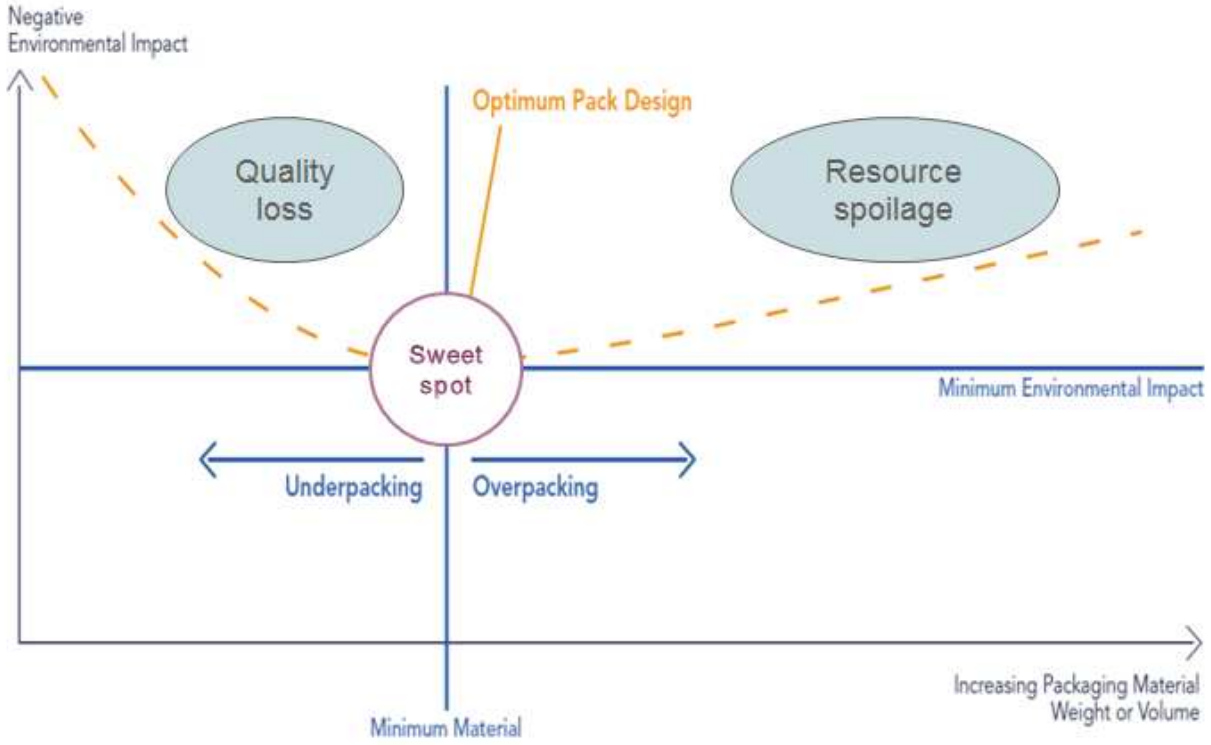
Vision:

All Nestlé packaging is optimized to use a minimum adequate amount of packaging by weight and volume.

Target:

Packaging reductions corresponding to at least 100’000 tons of packaging by 2017



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Packaging at Nestlé

- Nestlé uses more than 70,000 different packaging materials

- The key design factors:
  - *Product safety*
  - *Reduction of food waste*
  - *Convenance*
  - *Compatibility with existing recovery mechanisms*

- Packaging is always considered together with the packed product

Functions of active and intelligent packaging

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Potential functions and effects active and intelligent packaging:

- *Food waste reduction*
  Via forecasting and/or extending the exact shelf life of product
- *Reducing packaging weight or allowing use of different materials*
  Active components (oxygen scavengers) to replaceme aluminum
- *The monitoring of product safety*
  Via controlling the chemical composition/volatiles/appearance
- *Consumer engagement towards healthy nutrition, recycling, etc. (beyond the label)*
  NFC tags to connect to apps, creation of nutrition map, ….
- *Anti-counterfeit protection & advanced track and trace*
  Scanning at production, retail or by consumer

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Nestlé empowers consumers with new digital labelling scheme

Feb 1, 2013

Consumers in the United Kingdom will be the first to benefit from a new global initiative by Nestlé to give people instant access to information about the nutritional profile and environmental and social impacts of its products.

Anyone who buys a multi-pack of two-finger *Kit Kat* chocolate bars in the UK and Ireland will be able to find out more about what they are made of, how they fit into a balanced diet and lifestyle, and how they were produced, just by scanning the packaging with a smartphone.

INSTANT ACCESS: Consumers can get more information by scanning the product with a smartphone.

The *Kit Kat* multi-packs will carry a Quick Response (QR) code that will take co sites where they can find more detailed information about the product than wc available on a pack.

Information at your fingertips

Sample QR code

"We hope that consumers, wherever they are in the world, will use these QR codes to learn more about our products," said Patrice Bula, Nestlé's Head of Strategic Business Units, Marketing and Sales.

"We have a wealth of information about the nutritional value and the environmental and social impacts of what we produce, and it makes sense to share that with consumers."

A QR code is a type of barcode which consists of small black blocks arranged in a square pattern against a white background.

RFID and NFC are the future steps?

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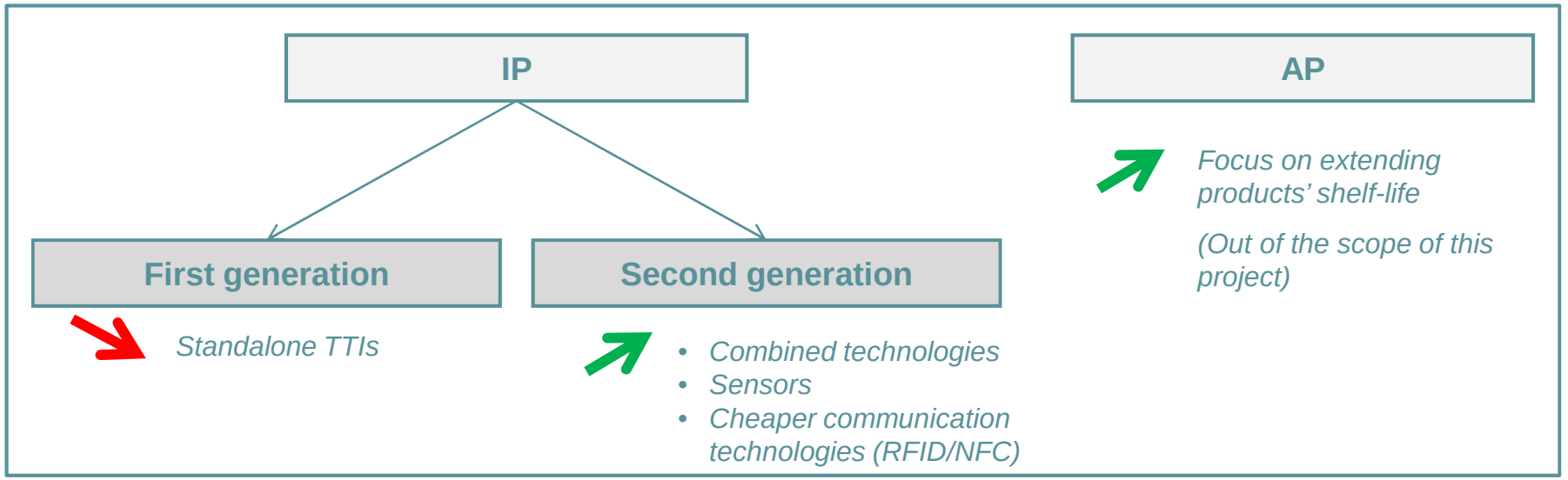
Evolution of the Intelligent Packaging Sector

- A second generation of technologies is expected to take the lead in IP products for food.

Foreseen evolution (10 year-horizon) on the development of IP & AP in the food sector



Technological maturity

- Indicators are the most advanced products today, with commercial products already available, in particular for TTIs.

Indicators

The most mature technology, with products already commercialized. TTIs can be considered as the “first generation” of IP technologies.

Communication technology

Already well developed and some products commercialized, with further ongoing developments, in particular to be used in sensors.

Sensors

More sophisticated technology than indicators, and far less mature, with strong ongoing developments for chemical sensors.

Additional technologies

Additional technologies that could find application in the food sector, in particular IoE with ongoing developments.

Stakeholder & application domains: Current situation

- IP can have applications either for the supply chain or for consumers.

Surrounding players

Regulatory authorities

Research institutions

IP companies

Food chain stakeholders

Food producer

Food transporter

Retailer

Consumer

Improve processes, freshness & safety, supply chain traceability

Main application domain in food for IP today

Improve freshness, safety & consumer experience

•IP technologies:
•*Focus on communication technology*

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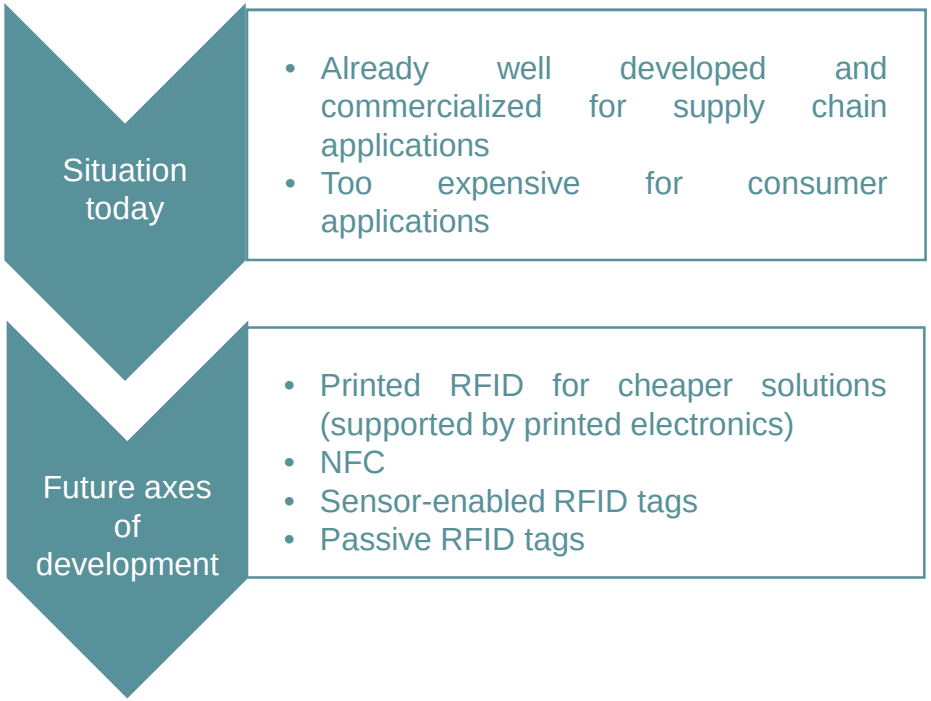
- Communication technology will continue its development, with an increased focus on cheaper approaches and solutions combining RFID with sensors.



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Technology Summary

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Current situation

- **Market:** less developed than what experts expected 10-15 years ago
- ***Main driver***: technology
- ***Main barriers***: retailers level of acceptance and costs

Future situation

- ***Main applications***:
  - Assist the consumer in daily shopping
  - Improve consumer experience of food products
  - Security
  - Combined functionalities
- ***Main driver***: Technology
- ***Main barriers***: costs and retailers' level of acceptance
- ***Regional differences:*** stronger dynamics in EU expected to bridge the gap with JP and US

Paper and paperboard as the substrate for the intelligent packaging

Why use paper as the substrate for active and intelligent packaging?

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- Paper based materials have been used in packaging in China since 2nd century BC (mulberry tree bark)
- It was bearing one intelligent function straight from the beginning: communicating about the content and attracting consumers
- Today, printability is not the only requirement from paper
- Internet of things, online shopping, increasing amount of weareble communicative devices promote the need of added functionalites

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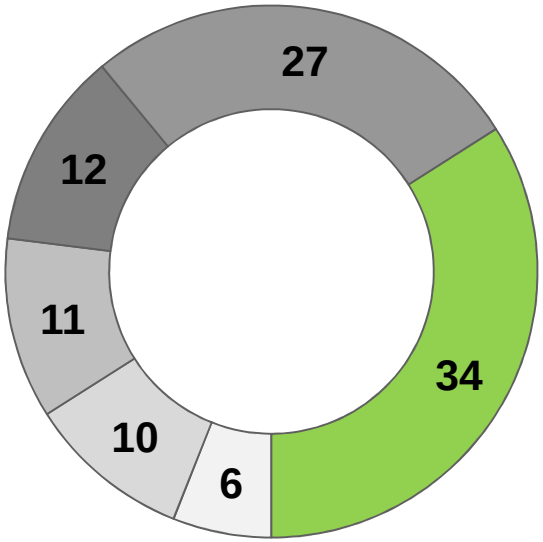
Packaging market nowadays



- Beverage cans,%
- Flexible plastics,%
- Glass,%
- Others,%
- Rigid plastics,%
- Paper and board,%

Source: FSC 2013

Paper packaging types:

- Folding box board
- Corrugated board
- Bags
- Sacks
- Wrapping paper
- Barrier papers
- Tea bags

Why use paper as a substrate?

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- *Compatibility with intelligent sensor/functionality*
  - *Flexibility: available in many different formats*
- *Interaction between product and sensor*
  - *Paper may not affect sensorial or texture characteristics*
- *Potential for recyclability irrespectively of added functionality*
  - *Features may not impair the repulpability of paper*
- *May not obstruct communicative features*
  - *Paper does not obstruct transmission of radio signals*
- *Excellent printability or encapsulation possibility*
  - *Proven to track record Demonstrating these features*

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Thank You!

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