

Yksilötason seurannan ratkaisut ja ympäristöystävällisyys

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Stora Enso Intelligent Packaging

**“Everything that’s
made with fossil-
based materials
today can be
made from a
tree tomorrow”**



26000

Employees



35

Countries



10 B
EUR

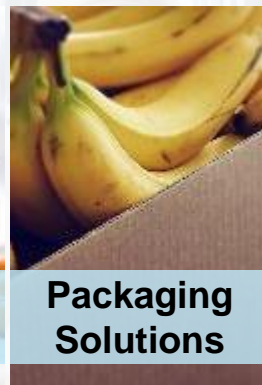
Sales



**Listed on Nasdaq
in Helsinki &
Stockholm**



**Packaging
Materials**



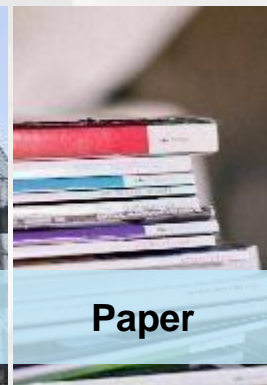
**Packaging
Solutions**



Biomaterials



**Wood
Products**



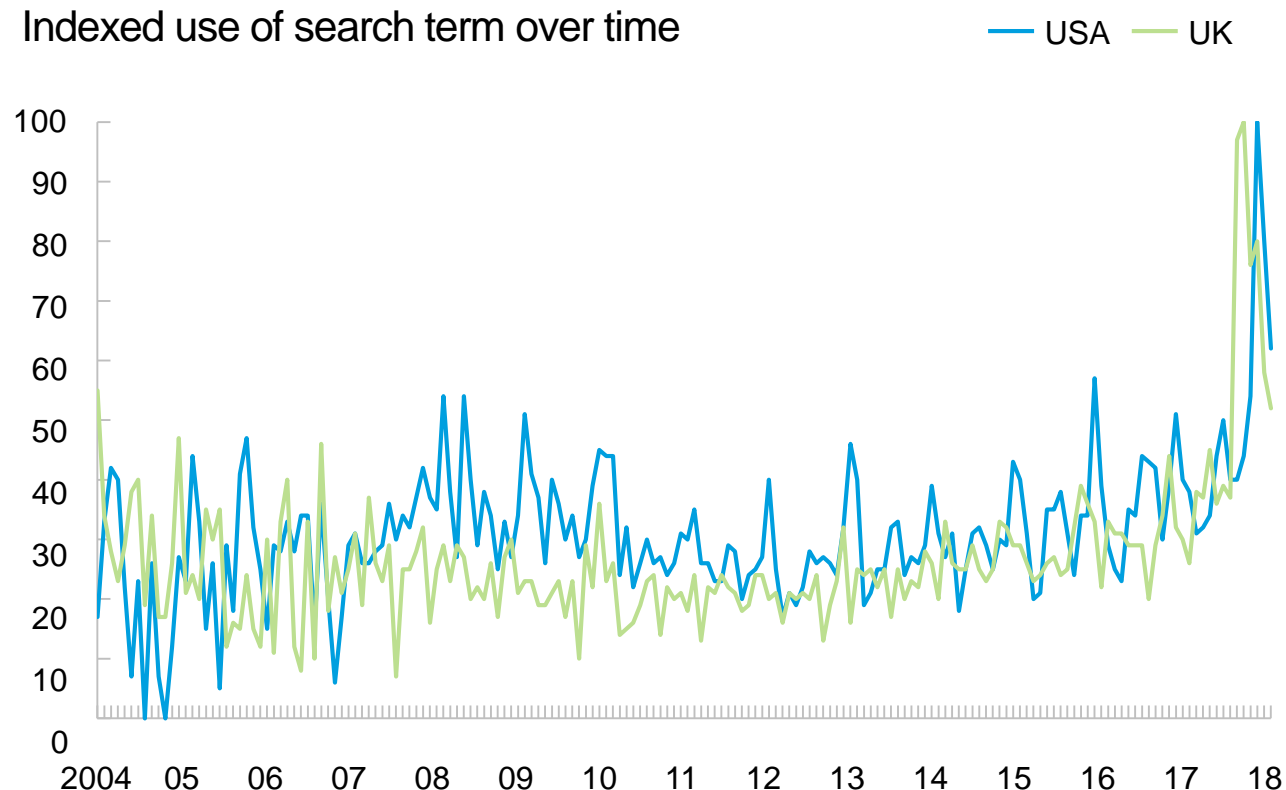
Paper

Consumers are increasingly worried about the impact on the environment



Google on “plastic waste” all time high

Indexed use of search term over time



SOURCE: Google trends, press search

Consumer concern is high ...

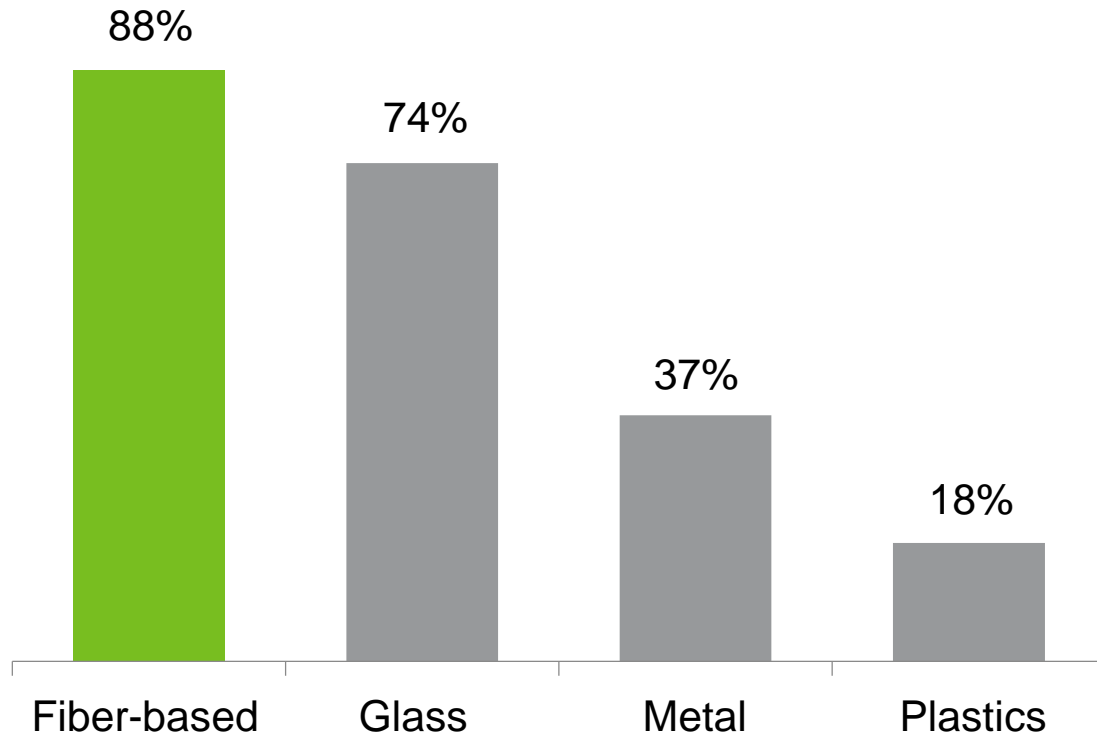
“ 24.6% of UK consumers expressed ‘extreme concern’ about plastic packaging in grocery
– Feb 2018, The Grocer

“ Nine out of ten people call for ‘plastic free aisle’ in supermarkets
– Jul 2017, Independent

... and policy makers are taking action

“ By 2030, all plastics packaging should be recyclable
– March 2018, European Commission

9 out of 10 Millennial consumers consider fibre based materials to be sustainable



Source: Viewpoint on the future of packaging for Millennials

Retail is strong but transforming



” Retail isn’t dying,
it’s changing

The development in retail affects various
to play a more significant role



Retailers have an extreme focus on saving costs



Increasing complexity in supply chain due to omnichannel



Sustainability is high on the agenda



Growth in private label gives more control to the retailers



The rise of e-commerce increases relevance of packaging



The possibilities within traceability keep expanding



Intelligent Packaging

Sustainable ECO RFID Tag and experience the unmanned store experience with Intelligent Cabinet. Enabling intelligent packaging, products and connected value chains

2019

THE RENEWABLE MATERIALS COMPANY

Stora Enso

Intelligent Packaging



Stora Enso Intelligent Packaging
digitalization of product and packaging
flows with RFID technology

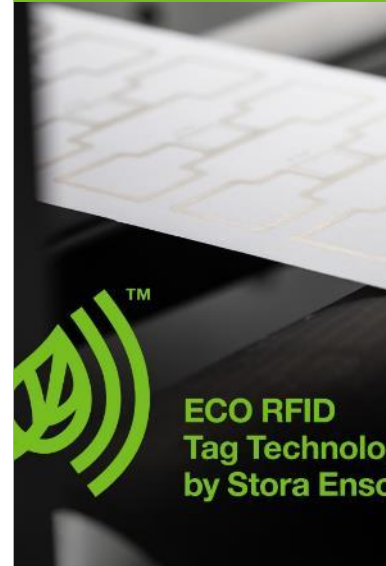
Independent Business Unit

Key benefits and uses of RFID

- Automated item level identification
- Inventory management
- Unmanned services
- Track and trace

Intelligent Packaging Verticals

ECO RFID
tag products



New Retail
solutions



Industrial
solutions



Visibility and related automation as business driver

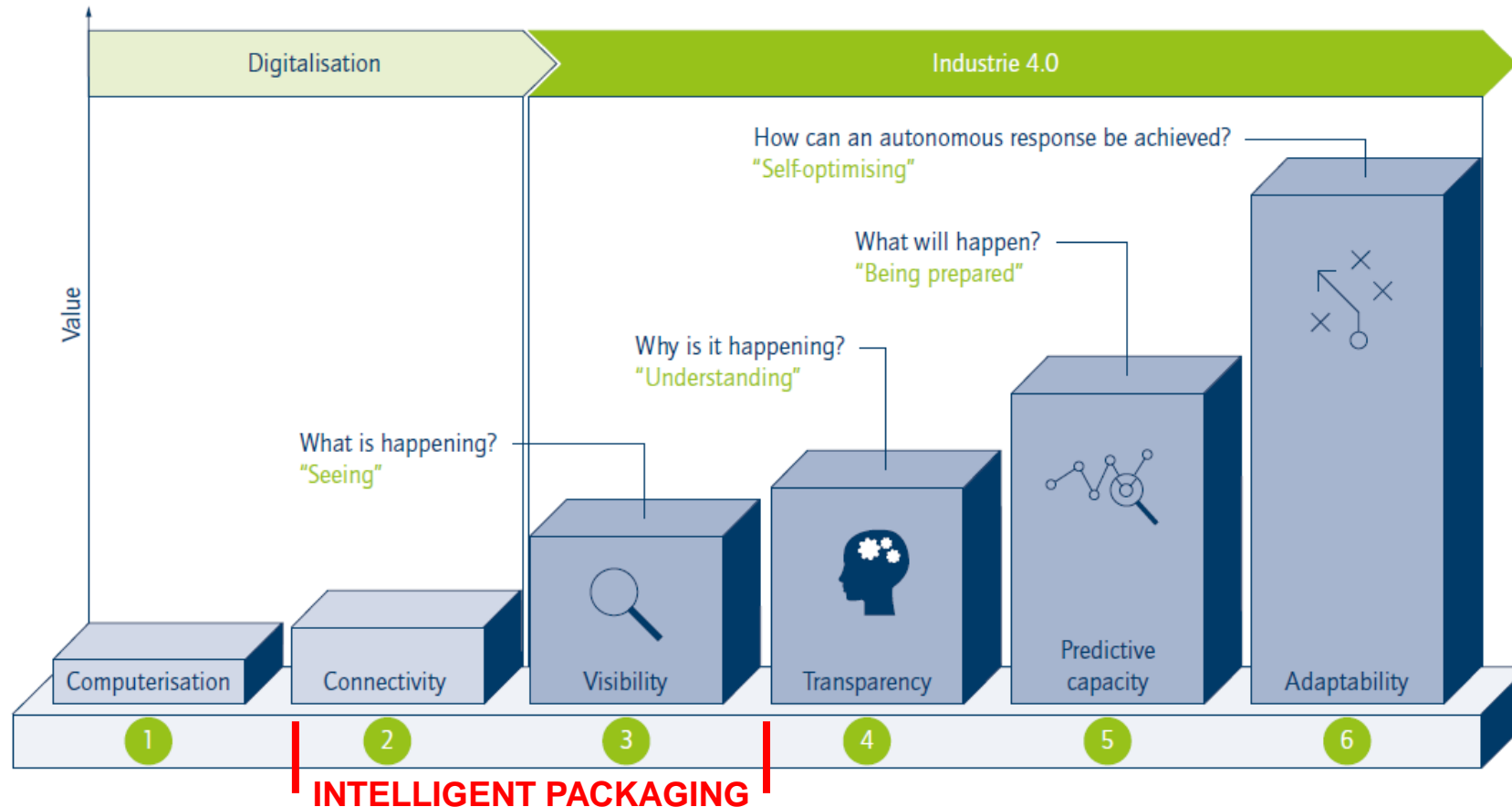
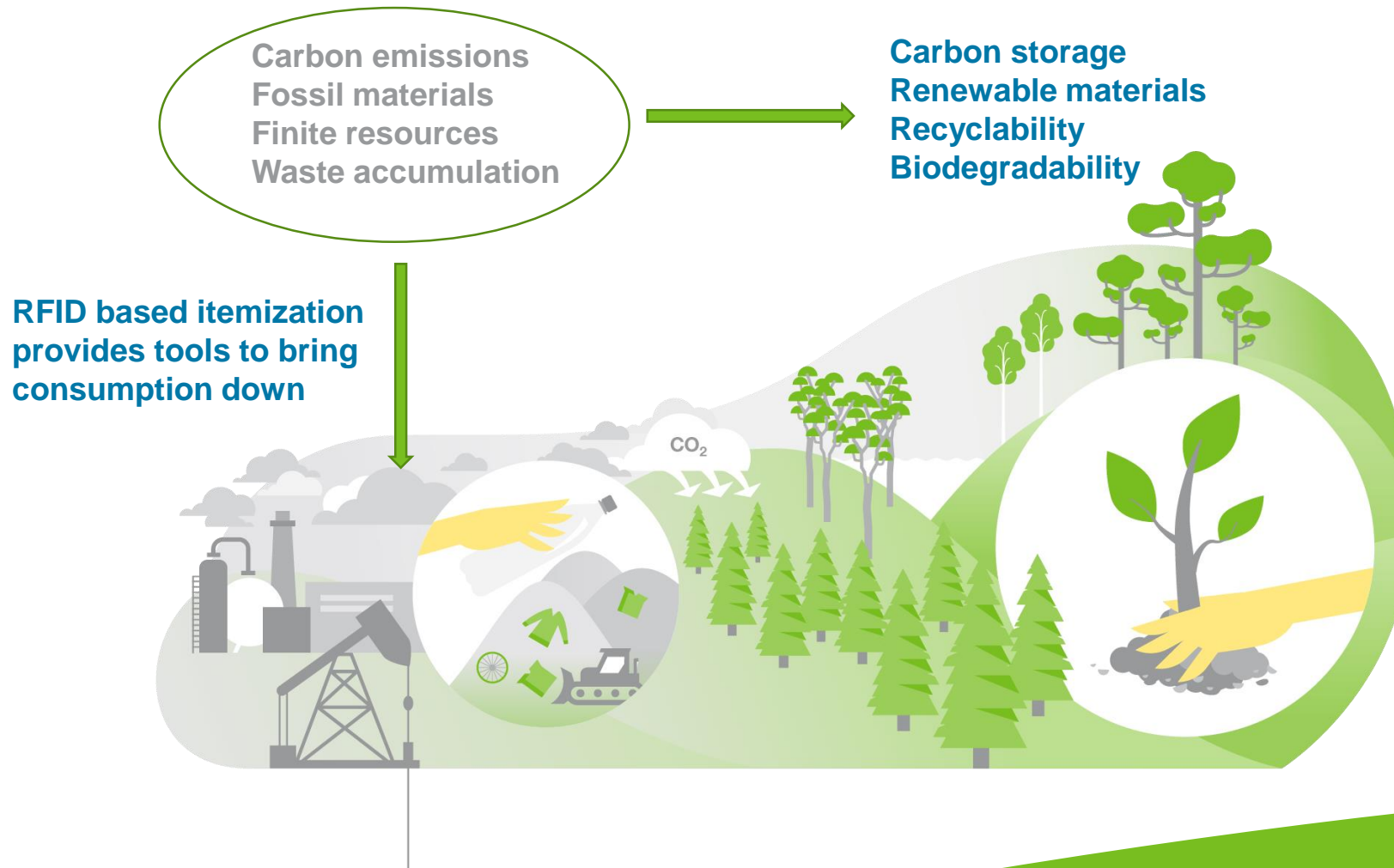


Figure 5: Stages in the Industrie 4.0 development path (source: FIR e. V. at RWTH Aachen University)

The world needs a new approach to materials



From a fossil world to a renewable future



EU: Staggering 40% of food in the grocery market is not even making it to the market.
Supply Chain Digital 2019

Inventory accuracy in stores averages 65%*
RFID Journal 2015

30 % of the 150 billion garments manufactured annually in retail are never sold.
www.sharecloth.com 2018

One third of the food produced for human consumption is lost or wasted globally
United Nations 2019



Connectivity with ECO RFID tag technology

- Innovative and feasible alternative
- Additive, dry antenna manufacturing process, high-speed IC assembly and simplified label converting machine
- Paper based
- Low cost conductor with high conductivity
- Environmentally friendly materials



No plastic substrate /
100% paper-based




Clean & green
manufacturing



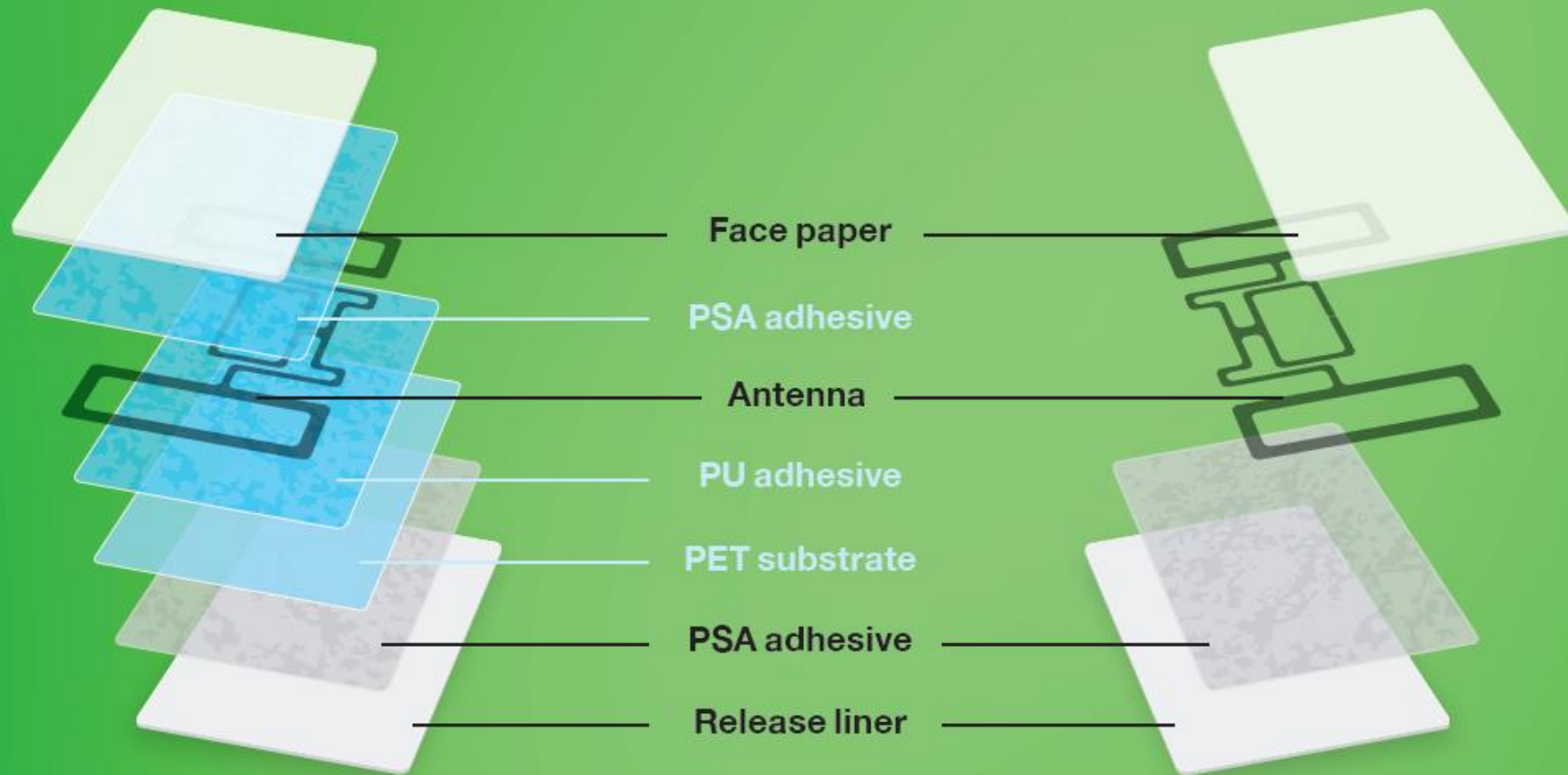
Low carbon
footprint



Recyclable

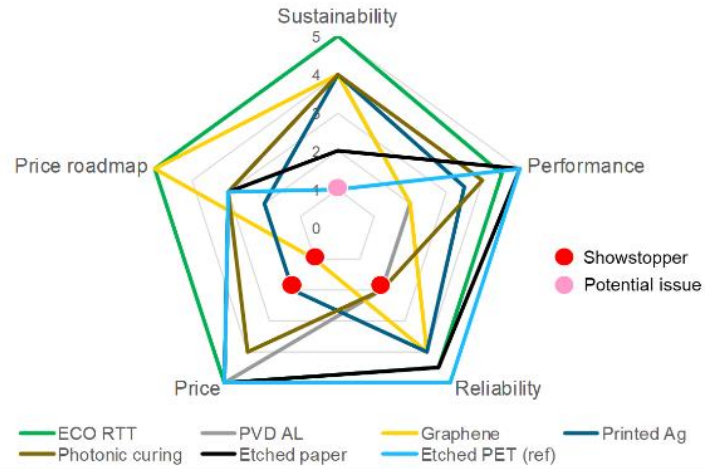


As a production technology,
ECO is fully compatible with
all Stora Enso's tag designs.

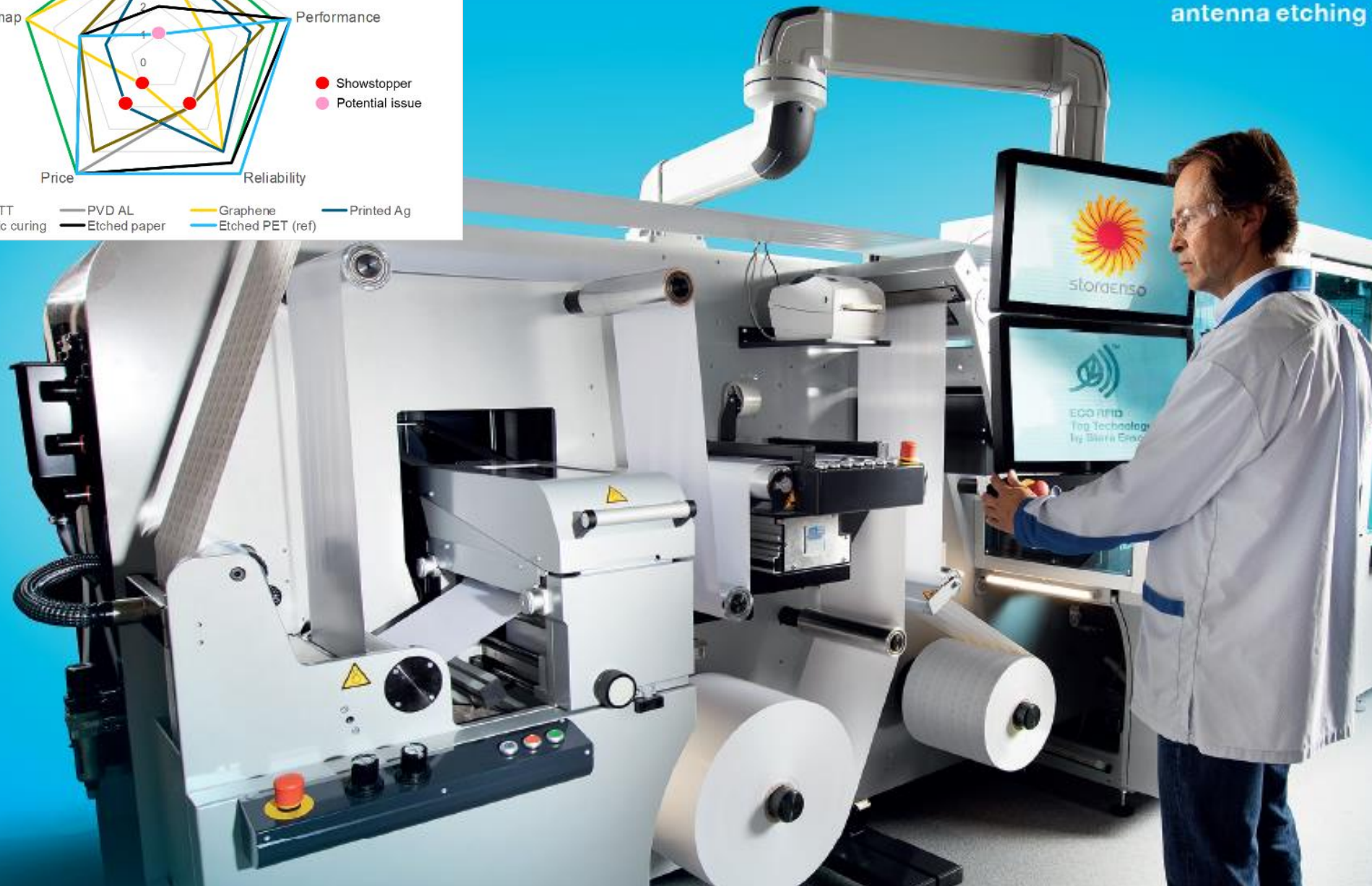


Traditional RFID structure:
6 layers + release liner

ECO RFID structure:
3 layers + release liner



**Efficient and small footprint
ECO antenna production line
can replace a chemical
antenna etching factory.**



- ECO RTT is the most balanced technology
- Most other technologies face challenges either in reliability or price
- Etched PET still very strong but sustainability may become an issue
- New technologies can arise (Al foil die-cutting, copper inks etc). Until now all rely on a conventional IC assembly method

ECO RFID Tag Technology – key advantages



Sustainable

- **Paper based, no plastic**
- **No harmful substances in production and assembly**
 - No chemicals required for etching
 - No carcinogenic substances
 - No polyurethanes, no nickel



Reliable

- **Tag passes all industry tests for reliability**
 - Temperature & Humidity IEC 60068-2-67
 - Temperature Cycling JESD22-A104-B
 - Tag Bending Test Voyantic Bendurance



High Performance

- **Outperforms silver ink, graphene vaporised aluminium based tags**
- **Competitive with etched Aluminium**



Cost Neutral



RFID in Retail

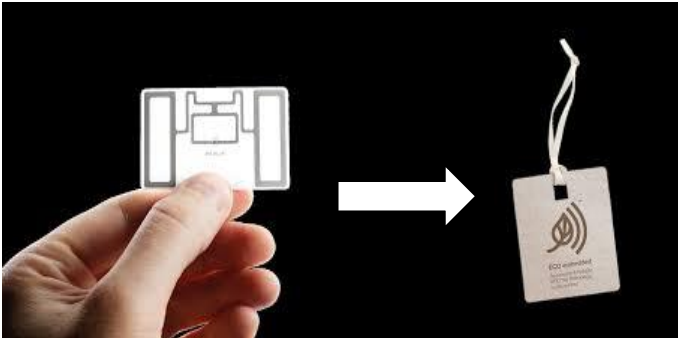
Over 100 retailers use RAIN RFID worldwide (UHF RFID)



- 98% inventory accuracy results
- Up to 20% sales boost with item availability
- 96% improvement in labor productivity



- 9% decrease in shrinkage
- 50% reduction in out-of-stocks
- 96% time reduction with smart inventory



ECO Bumper RAIN RFID Label

Stora Enso, Intelligent Packaging



Sustainable RAIN RFID label for industrial applications

ECO Bumper UCODE 8 makes the perfect choice for demanding applications. ECO Bumper features best-in-class performance, reliability and a flexible structure. It is designed and optimised for global industry and supply chain applications. ECO Bumper delivers excellent performance on a wide range of materials end environments.

Use of paper substrate enables a thinner tag structure, eliminating one plastic substrate layer and two adhesive layers. Thinner structure makes the label more flexible and the label adheres well on curved surfaces such as paper roll cores. The label is fibre-based and can be recycled together with other fibre-based packaging or material. Environmentally friendly ECO Bumper has no impact on existing waste streams or recycling processes.



Applications



Industry



Supply chain
management



Retail

Key features of ECO Bumper

High performance for demanding applications

ECO Bumper is ideal for demanding logistics and supply chain applications. ECO Bumper features best-in-class performance on a wide range of dielectrics, in challenging environments and provides the reliability required for high grade of automation and efficiency.

A reliable choice

ECO Bumper passes industry standard tests for temperature and humidity (IEC 60068-2-67), temperature cycling (JESD22-A104-B) and tag bending tests. These comprehensive tests ensure ECO Bumper performs at all stages of the product's life cycle and can safely be used to track items from source to point of sale.

Global tag for global operations

ECO Bumper makes the ideal choice for global operations, as it is compliant with current frequency regulations. Embedding ECO Bumper into packaging or converting ECO Bumper into stickers is easy – the delivery format is a 2-layer paper tag without the extra polyester layer found in all traditional etched inlays.

About Stora Enso

Our aim is to replace non-renewable materials by innovating and developing new products and services based on renewable materials. And by transforming the world, we are transforming ourselves too; growing our expertise to meet the needs of our customers and overcome many of today's raw material challenges. As the leading global provider of renewable solutions in packaging, biomaterials, wooden constructions and paper, we employ around 26,000 people in 35 countries. Intelligent Packaging by Stora Enso is a leading global provider of products and services that enable our customers' digital transformation using the internet of things (IoT). We provide them with the means to connect physical items, gain efficiency, quality and visibility and exceed their customers' expectations.



Stora Enso's ECO Bumper UHF label in 60% of its natural size.

Technical details

Sales Code
500012

IC & electrical details
NXP's UCODE 8
128 bit EPC
860 - 960 MHz
EPC Gen2v2, ISO 18 000-63

Size
Paper Tag size 97 x 27 mm / 3.82 x 1.06 in

Web width
100 mm

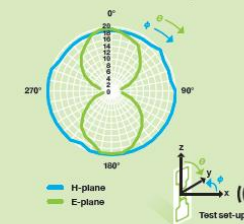
Operating temperature
-5 °C...+60 °C / +23 °F...+140 °F

Delivery details
76 mm / 3 in core
1 year shelf life in +20 °C / 68 °F, 50 % RH

Theoretical read range forward



Orientation sensitivity



Contact us for more information:
www.storaenso.com/intelligentpackaging

The performance of the product should always be tested in the actual application conditions. Our recommendations are based on our most current knowledge and experience and the pictures and illustrations presented in this document are for illustration purposes only. As our products are used in conditions beyond our control, we cannot assume any liability for damage caused through their use. Stora Enso reserves the right to change its products and services at any time without notice.



THE RENEWABLE MATERIALS COMPANY



ECO Tag designs:

- ECO Stripe
- ECO Bumper
- ECO Hanger
- ECO Bale

ECO RFID Tags – availability

A network of respected partners



r-pac International Corporation

identify with us!

Intelligent
Inventory
Solutions

SML



 **fast value global inc.**



MAXIM

TENTAC



ESQUEL GROUP



New Retail Solution by Stora Enso

Signals and activities



Trends:

- Global convenience stores sales US\$4,902 billion in 2022*
- Food & grocery dominating with a forecast share of 93.6% in 2022*
- Convenience retailers develop ranges in response to consumer lifestyle preferences
- Increasing consumer affinity towards smaller format stores that offer convenience is driving sales in the channel*

Industries focusing on:

- Image recognition
- RFID
- Scales & weight
- Trust

New business model emerges for delivering convenience – like sport clubs, hotels, office buildings

Expanding the reach – satellite concepts – existing brick and mortar retailer being present where not today

Going for the near future opportunities – towards the best brick and mortar solution which would be scalable and convenient

New Retail solutions



New Retail Solution by Stora Enso

Announcement in World Retail Conference –
Amsterdam 14 May 2019

Stora Enso Intelligent Packaging launched New Retail Solution with successful pilots in China and Europe.

The full solution enables *Unmanned, Automated and Always Open Retail Experience* allowing consumers to independently buy items from Intelligent Cabinets using mobile payments.

- Modularity and
- Scalability

New Retail focuses especially on convenience sales in urban environments.



Full solution

Analytics

Mobile payments

RFID tech



To learn more read online at storaenso.com/intelligentpackaging or
www.taggedvalue.com

New Retail – The Non-Traditional Retail

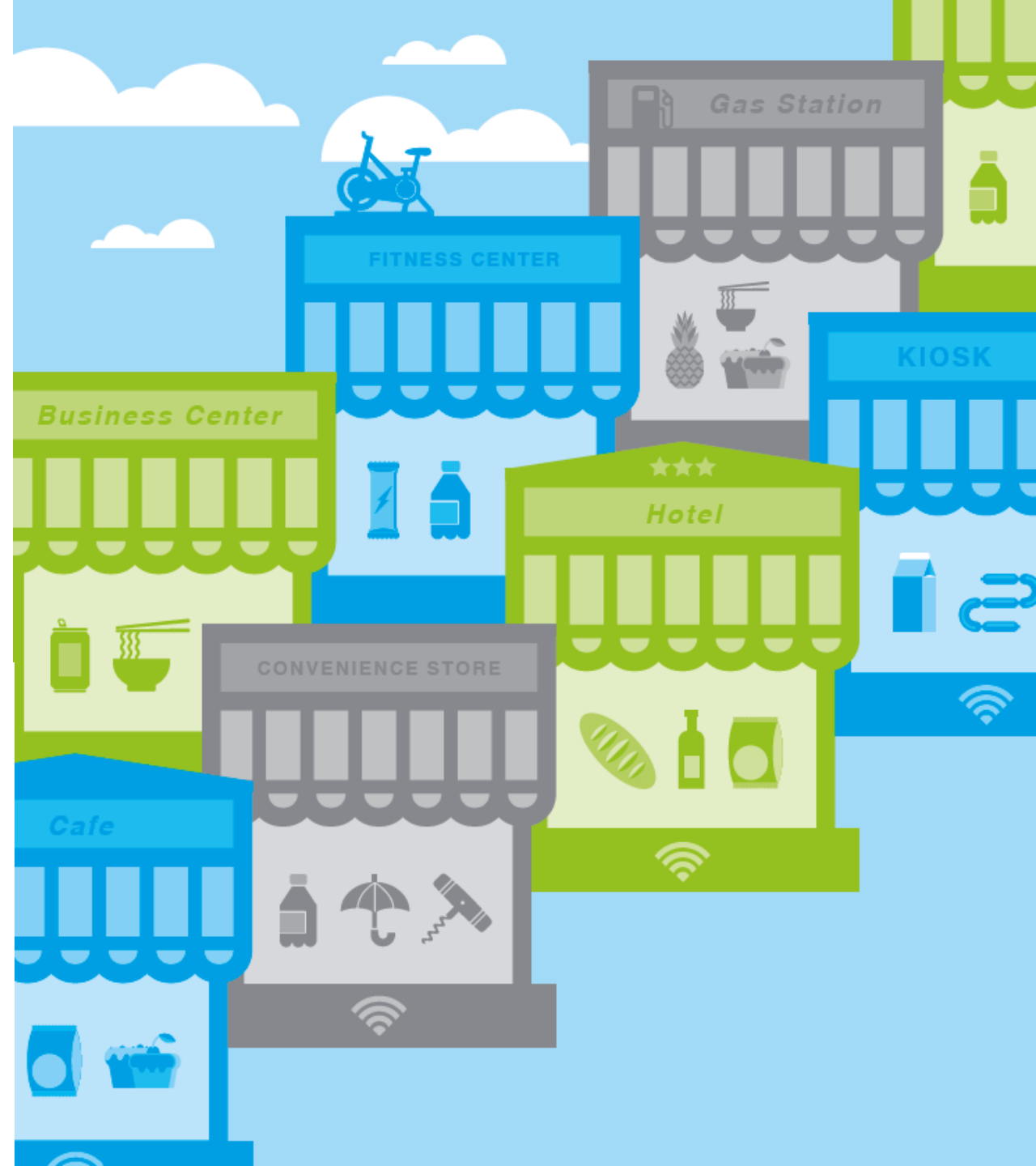
World moves to cities and urban lifestyles emerge.

- Public transportation
- Work, home and hobbies
- Limited spaces and overload of goods at home

Rise of convenience at hand.

New touchpoints for B2C to start with.

- Work: office and school buildings
- Leisure: hotels and fitness centers
- On-the-go: store fronts in transportation hubs and petrol stations.



Intelligent Cabinet

Consumer Purchase Process



1. Consumer open the cabinet using common payment application on the phone: Apple/Google Pay, WeChat, MobilePay or similar
2. Door unlocks
3. Customer selects items. All items are uniquely identified using sustainable, paper based anti-tamper RFID tags
4. Fridge re-locks, performs inventory reading and displays purchases on screen. The customer receives purchase receipt to phone.
5. Retailer or Brand owner receives real-time information about stock, purchases and use-by dates

Our **End-to-End Offering** covers all areas needed to run New Retail business



Complete solution for New Retail



Intelligent Cabinet Management

Software driving efficient operations



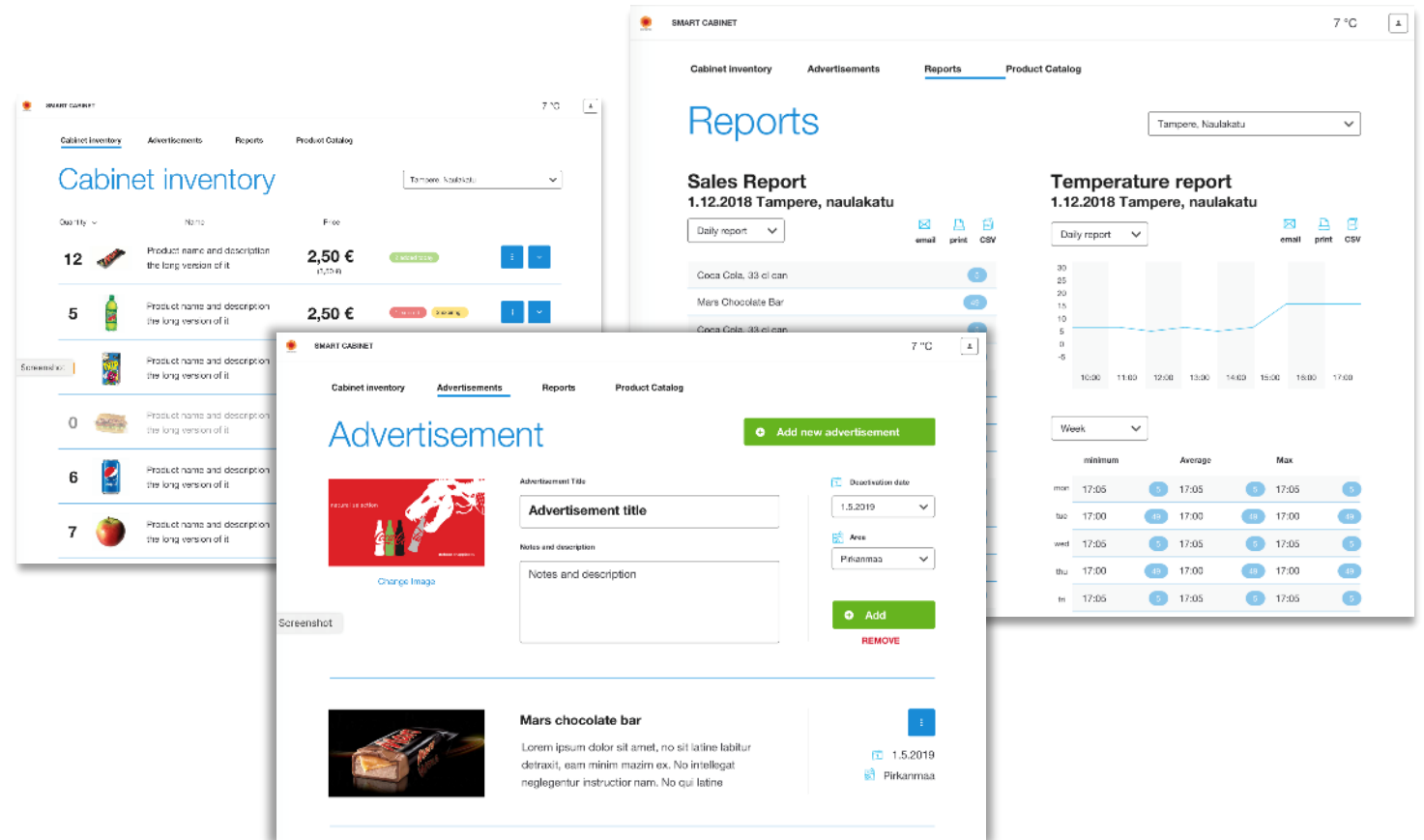
Cabinet is managed through web-based software solution:

Management service

- Inventory management
- Promotions broadcasted in screens
- Sales reporting
- Ability to connect through API with common PoS infrastructure

ReFill app

- Made for replenishment automation
- Allows operator to open the cabinet and perform replenishment



Areas to Consider for Brand Owner

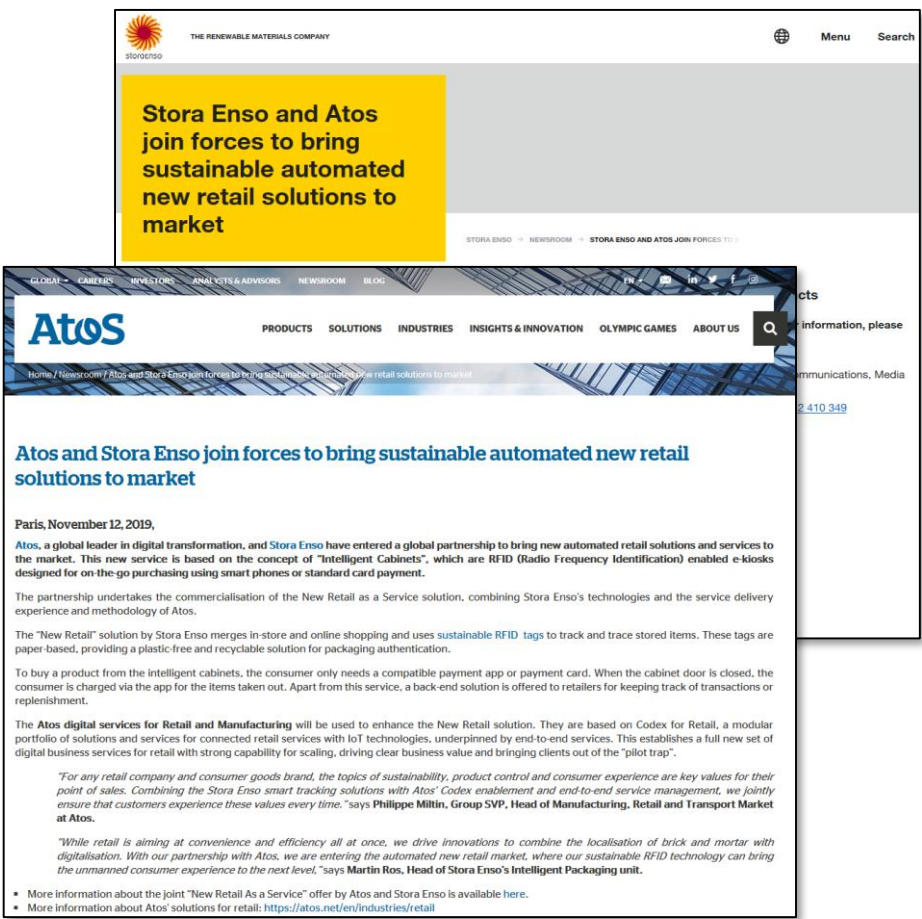


- ❑ Location, location, location.
- ❑ Offering and branding.
- ❑ Payment and replenishment tactics.

**Customer insight
& service concept**



Main partners





Contact us for more information:
www.storaenso.com/intelligentpackaging

Thank you.

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