

EHI WHITE PAPER

Sustainable Smart Stores 2021

Digital Sustainability Solutions for the Retail Industry



EHI

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Microsoft

Contents

03 INTRODUCTION

03 What Does Sustainability Have to Do with Smart Stores?

04 WHAT IS SUSTAINABILITY?

04 In Society

05 In Technology

08 In Retailing

09 WHAT ARE SMART STORES?

09 Formats

12 WHAT ARE SUSTAINABLE SMART STORES?

12 Technology

15 RESULTS OF THE EHI RETAILER SURVEY

24 DIGITAL SUSTAINABILITY SOLUTIONS FOR THE RETAIL INDUSTRY

24 Headquarters

29 Supply Chain & Logistics

32 Product Range & Production

38 Stores

48 Customers & Circular Economy

55 CONCLUSION AND OUTLOOK

55 Appendix

55 Customer Stories – Overview

56 Microsoft Partner Solutions – Overview

57 APPENDIX

57 List of Figures and Tables

58 About EHI

58 About Microsoft

59 Publication Details



Information

Click on the headings under Navigation to go directly to one of the sections.

EHI

Some of the graphics shown in this study are available in our online statistics database at www.handelsdaten.de and can be downloaded as xls, pdf and jpg files.

You can find further statistics and graphics on smart stores on our topic pages at

<https://www.handelsdaten.de/handelsthemen/smart-store>



Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Introduction

What Does Sustainability Have to Do with Smart Stores?

Sustainability has become a familiar term in business and everyday life. In retailing, it plays an especially important role in business operations, and at the same time it is a key consideration when it comes to enhancing a store's image with customers.

Sustainable business processes are now easier to organise and monitor thanks to increasing digitalisation. However, digitalisation can also have a negative impact on sustainability goals. For example, CO₂ is generated through the manufacture of smartphones, computer monitors and IT-infrastructure, and energy is required to operate digital systems.

As a consequence, "smart stores", which rely on sensor systems, the Internet of Things and artificial intelligence (see the previous EHI + MSFT white papers [Smart Store, AI in Stores](#)), are more energy-intensive than those which make little or no use of digitalisation.

In the following we will look at some examples of smart stores that are increasingly applying digital technology while still being able to contribute to sustainability.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

What Is Sustainability?

In Society

In 2015, the United Nations adopted Agenda 2030, which laid out a global roadmap for a more sustainable future. The Agenda comprises 17 Sustainable Development Goals (SDGs) for civil society, the private sector and science. Its objective is to achieve sustainable consumption, based as much as possi-

ble on the use and reuse of renewable resources. In this way the current linear economy is to be replaced by a circular economy. One of the tools is a comprehensive **SDG Tracker**, which reports in detail on the worldwide status of the 17 goals and monitors the progress being made by each country.

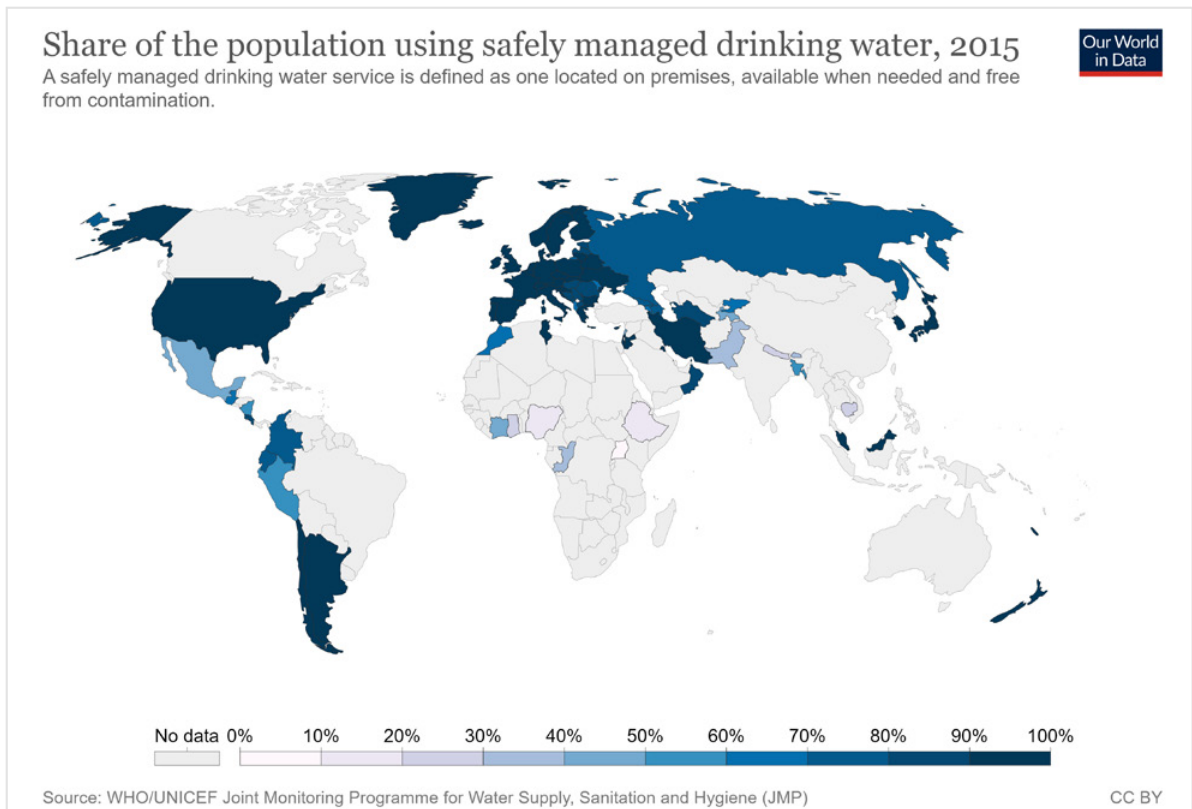


17 United Nations Sustainable Development Goals

Source: UNDP – United Nations Development Programmes

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)



Map in the SDG Tracker for Goal 6.1, “Clean water and sanitation for all”

Source: WHO/UNICEF

Through their purchasing behaviour, end consumers in industrialised and newly industrialised countries have a decisive impact on value chains and supply chains, and thus on the global sustainability goals. Consumers are guided by numerous seals that show compliance with standards. One example in Germany is the Blue Angel, a government ecolabel that has been in existence for 40 years. More than 12,000 products and services fulfil its strict criteria.

Manufacturers of consumer goods have a direct influence on sustainability goals through their production conditions and the organisation of their value chains. Retail enterprises, which serve as a link between manufacturers and consumers, are in a unique position to promote sustainability in their product ranges and business processes. In this way they can also foster consumer awareness.

In Technology

Digitalisation of business processes has gained acceptance among retailers and producers of consumer goods by helping them to increase efficiency and harness synergies to cut operating costs. Another advantage is that it allows them to meet customers’ needs and expectations. However, the potential of digital solutions to contribute to sustainability can

only be leveraged if the energy and resources they consume are saved through other measures.

Digital solutions can also lessen the impact of business processes on our climate and environment. For example, knowledge derived from data and algorithms can be used to increase efficiency and optimise processes. This can reduce the

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

consumption of energy and resources, and it can facilitate reuse and recycling. [Climate Change Mitigation Through the Use of Digital Technologies \(bitkom.org\)](#)

[gation Through the Use of Digital Technologies \(bitkom.org\)](#)

Microsoft’s commitment to sustainability

As a company with global operations, **Microsoft** is very much aware of its responsibility in regard to sustainability. Protection of our planet is the foundation of our mission, which is to enable every person and organisation to achieve more. Microsoft announced its first sustainability goal, reduction of carbon emissions, already back in 2009. During the past ten years we have continually expanded our sustainability goals throughout the company.

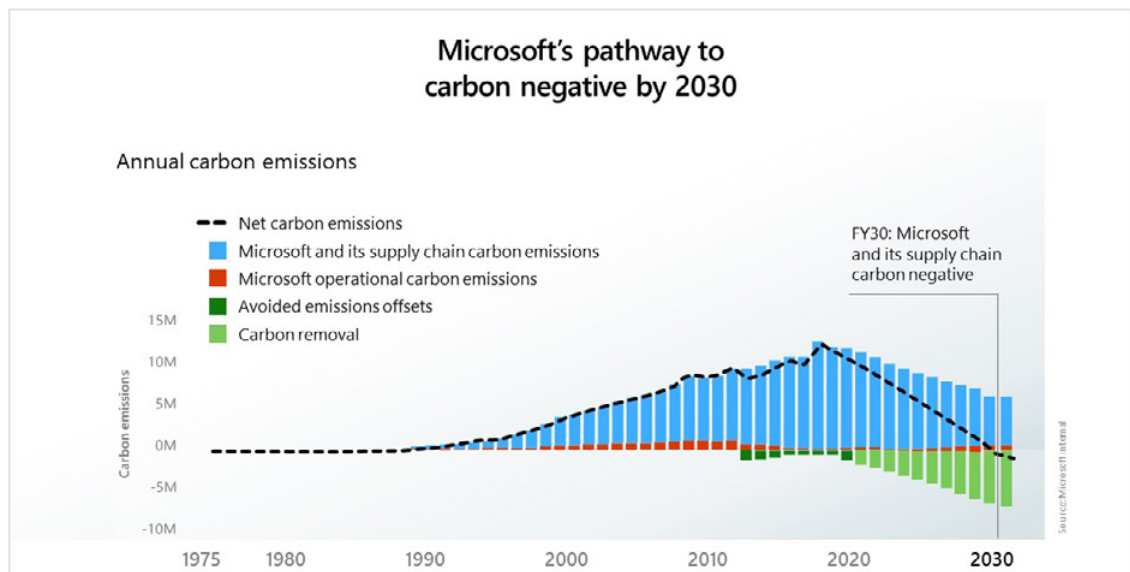
Together with partners, researchers and NGOs, Microsoft is now making great efforts to increase sustainability. The focus is on four areas: carbon emissions, waste, water and biodiversity.

Carbon EMISSIONS

- **Goal:** To be carbon-negative by 2030
- **Significance:** By 2030, we will be removing more carbon from the atmosphere than we release into it. By 2050, Microsoft will have removed all of the

carbon from the atmosphere that it has emitted, directly or through power consumption, since it was founded in 1975.

- **Measures:** We will increase the share of renewable energy sources used for powering our data centres to 100 percent, and we intend to reach 70 percent by 2023. We are requiring our suppliers to disclose their carbon emissions and are helping them to reduce their carbon footprint.
- **Tools:** In order to achieve greater transparency relating to emissions caused by services and products, we have developed a **Sustainability Calculator** that companies can use to analyse their carbon footprint from using Microsoft Cloud Services and compare it to the carbon footprint of their on-premise data centres. The results can be used for reporting on sustainability.



Microsoft’s annual carbon emissions leading up to achievement of its carbon-negative goal. Source: Microsoft

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

- **Alliances & partnerships:** As a founding member of the „[Transform to Net Zero](#)“ Alliance we are cooperating with a number of companies, including A.P. Moller-Maersk, Danone, Mercedes-Benz AG, Nike, Starbucks, Unilever and Wipro, to move the economy towards net zero emissions. The measures applied by these companies will remove all of their greenhouse gas emissions from the atmosphere.

WASTE

- **Goal:** To be waste-neutral by 2030
- **Significance:** Waste production and disposal are major sources of emissions. For this reason, we are taking special measures in our data centres and through our product packaging to promote sustainability.
- **Measures:** The Circular Centres at Microsoft's data centres sort through discarded hardware components on site by means of artificial intelligence in the cloud and mark them for repurposing. This will increase the reuse of servers and their parts to 90 percent by 2025. In addition, single-use plastics will be eliminated in packaging and replaced by innovative packaging solutions with greater sustainability.
- **Tools:** We are investing in the collection of waste data and the development of digital solutions for tracking waste chains.
- **Alliances & partnerships:** Microsoft is investing USD 30 million in funds from [Closed Loop Partners](#) to support supply chain digitalisation, recycling and the creation of a circular economy.

WATER

- **Goal:** To be water-positive by 2030
- **Significance:** Across all business units, we will treat more water than we consume.
- **Measures:** Microsoft will reduce its water consumption, treat the water it uses and return this water to use.
- **Tools:** The [Water Risk Monetizer](#), a tool developed by Ecolab together with Trucost and Micro-

soft, enables companies to quantify the financial risk associated with water availability and quality. It uses local information on water use, costs, quality, business volume and predicted production to calculate the total value of water used and discharged, taking possible local water shortages into account.

- **Alliances & partnerships:** We are a member of [The Water Resilience Coalition](#), a cooperative alliance of companies and NGOs dedicated to the responsible use of water.

BIODIVERSITY – SPECIES PROTECTION IS ALSO CLIMATE PROTECTION

- **Goal:** Collecting environmental data from around the globe, processing it by means of machine learning and making it available worldwide.
- **Significance:** Global warming is closely associated with large-scale ecosystem destruction, species extinction and other dramatic consequences. But the threat is not limited to species diversity on our planet; it extends to the ecosystems on which these species depend.
- **Measures:** The [Planetary Computer](#) will collect environmental data from throughout the world and record trillions of data points.
- **Tools:** The Planetary Computer will give the AI for Earth community access to important data sets through more than 500 projects in 81 countries. It will also provide a platform for analysing the data.
- **Alliances & partnerships:** [AI for Earth](#) is a global community of environmental researchers, environmental engineers and companies who are developing models to protect our planet based on the open-source principle and AI tools. Besides contributing its technological expertise, Microsoft is investing USD 50 million in this initiative. In addition, over the next four years we will be investing USD 1 billion through our [Climate Innovation Fund](#) in new technologies for climate change mitigation and the solution of environmental protection problems.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

In Retailing

Sustainability has played an important role in retailing for some time. For years, many large retail enterprises have been publishing sustainability reports outlining their goals, initiatives and progress, often with reference to the Sustainable Development Goals of the United Nations. Small and medium-size retailers have likewise emphasised sustainability, for example by establishing energy-efficient stores or installing sustainable lighting.

Industry organisations have also launched relevant initiatives. Examples are the German Retail Federation (HDE) and the EHI Retail Institute with its many special topics such as energy management and building. Another organisation focusing on sustainability is GS1, with its projects to promote a circular economy.

Retailers must meet a number of requirements in their efforts to achieve sustainability, including legislation at the national and EU levels such as the German Packaging Act and an act, currently under discussion, applying to supply chains. There is also the European Green Deal and the European Climate Law based on it, which sets the goal of making Europe climate-neutral by 2050.

These approaches are reflected in a variety of initiatives and measures covering the entire supply chain and process chain. They are summarised in the following table.

Typical areas of focus and action

(Table 1)

Area of focus	Approaches/measures
Headquarters	<ul style="list-style-type: none"> ■ Cloud infrastructure & digital collaboration ■ Sustainability tracking & reporting ■ Central smart energy management ■ Green building and ecology minded building*
Supply Chain & Logistics	<ul style="list-style-type: none"> ■ Supply chain transparency ■ Optimised logistics processes ■ E-mobility and alternative drive technologies*
Product Range & Production	<ul style="list-style-type: none"> ■ Sustainable production ■ Product range optimisation for waste reduction ■ Process optimisation in production ■ Sustainable packaging*
Stores	<ul style="list-style-type: none"> ■ Smart energy management in stores ■ Inventory optimisation ■ Waste reduction ■ Generation of electrical and thermal energy*
Customers & Circular Economy	<ul style="list-style-type: none"> ■ Customer commitment to sustainable consumption ■ Transparency & traceability ■ Circular economy & recycling ■ Electric vehicle charging stations*

* Not dealt with in this white paper because most approaches are non-digital.

Source: Microsoft

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

What Are Smart Stores?

“Smart store” is an umbrella term for stores that utilise a variety of digital solutions. The purpose is to make operations more efficient and offer customers more information or services. Many of these solutions are necessary in order to enable linking of online and offline channels, and they open up further channels for hybrid shopping such as online ordering followed by pickup at an automatic vending machine or delivery by car.

This is what bricks-and-mortar retailing will be all about in the future. Using sensors, the Internet of Things, machine learning, mixed reality and technologies that leverage artificial intelligence (AI), fixed-location stores will offer all the personalised shopping advantages that we have come to appreciate from e-commerce.

Formats

Stores with digital solutions

CUSTOM SOLUTIONS Increasing numbers of stores are applying solutions that are tailored to their individual requirements. For example, they are using existing security cameras or motion sensors at their entrances to count customers. This can allow them to set up customer traffic lights with digital signage showing “green – entry permitted” and “red – please wait”. In most cases these stores are not part of a modern, comprehensive outlet infra-

structure, and their internet bandwidth may be limited. By taking advantage of their cameras and using computer vision, i.e. AI-based image analysis, these stores can cover a variety of needs, such as supporting operative processes and monitoring promotion shelves for stock levels and customer traffic. Examples: [Bütema](#), [Dynamics 365 Connected Store](#).

Autonomous and semi-autonomous stores

FOCUS ON SELF-CHECKOUT Autonomous, unstaffed stores usually have a small floor space of approximately 50 sqm and some 800 articles on offer. Customers gain entry by means of a special app. The doors are closed during shopping. Purchases are completed by self-checkout via the app or at a check-out station. After checkout, the doors open and customers can leave.

Semi-autonomous formats, with limited staff or no staff at all, are an increasingly common variant. Customers can enter the store outside normal shopping hours or even 24/7 and pay at a self-checkout station or with an app. Security and theft protection are ensured by cameras, employees or personalised access. Examples: [MishiPay](#), [Rapitag](#), [GK Software](#).

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Automated stores

FROM ROBOTS TO MICROWAREHOUSES A new format, based on a system that has already been used for some time by pharmacies, relies on a small warehouse which receives deliveries when orders are placed online. When customers come to pick up their purchases, a dispensing robot moves the items to the pickup window. Products can be fetched and paid for at any time. The robots optimise warehouse efficiency and considerably accelerate the provision process. The automatic gripper systems can retrieve and move up to 14 packages at a time. A video camera identifies the products and records them.

In another new trend, certain parts of a store are being transformed into what are called micro-warehouses. Goods that are ordered online can be picked from here instead of from the store shelves. This increases picking efficiency, simplifies inventory management and prevents possible competition in the store between customers and pickers. Microwarehouses can also be automated by means of robots that combine the characteristics of a dispensing robot and warehouse robot and can operate in small areas. Examples: [BD Rowa](#), [Self Point-Stor.AI](#), [Attabotics](#).

Automated parcel machines and retail machines

THE SOLUTION FOR HYBRID SHOPPING Automated parcel machines and retail machines are ideal as shopping points or pickup stations in hybrid shopping. They are available in a wide range of types (for example, for refrigerated or unrefrigerated goods), with different payment methods and in different sizes. Many automated retail machines offer additional functions such as digital screens that

show dynamic prices and videos. Sensor systems can monitor stocks automatically. Automated parcel machines can be configured according to the number and size of the compartments and can be equipped with special management software and retailer-specific apps to encourage customer loyalty. Examples: [Stora Enso Smart Cabinet](#), [Invenda](#), [StrongPoint](#), [Ombori](#) together with [ITAB](#).

Seamless or frictionless shopping

AUTOMATION OF THE ENTIRE SHOPPING PROCESS THROUGH GRAB & GO Frictionless shopping, sometimes called grab & go, is the ultimate in automation. Here customers simply select their merchandise and walk out of the store. However, these concepts are very hard to implement. Customers must be identified when they enter. The movements of people and goods must be tracked, and the two must be correlated – this is the only way to en-

able fully automatic checkout without a stop on the way out. A wide range of sensor systems are required, such as cameras on ceilings and shelves and weight-sensing mats. In addition, IoT solutions are needed for aggregating the sensor data, and AI must be used analysing the data and following the movement of customers and goods. Examples: [AWM](#), [Zippin](#), [UST Global/CloudPick](#).

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Digital store twins

STATE OF THE STORE IN REAL TIME A digital twin is a digital representation of an object or building, including all equipment, things and processes. Accordingly, a digital store twin is a digital representation of a store together with all equipment, machines, furnishings and articles – in real time. This requires a large number of sensors, a suitable IoT platform and artificial intelligence for evaluating the

sensor data. Considerable computer power is required for checking and displaying this information on a continuous basis. Ideally, digital twins should be possible for large stores, but at present there exist only conceptual approaches and pilot versions. However, in the manufacturing industry they are already possible for production facilities. Examples: [Azure Digital Twins](#).

Navigation

Contents | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

What Are Sustainable Smart Stores?

Sustainable smart stores are stores that are equipped with digital solutions in order to make their operations more efficient and offer their customers more services. At the same time, these solutions make it possible to pursue a variety of sustainability goals.

For example, digital solutions help to save energy, thereby minimising carbon emissions. They are used in control systems for buildings and equipment, including lighting control, energy-efficient light management, optimisation of air-conditioning

and refrigeration, and efficient generation and use of electrical and thermal energy. Digital solutions additionally make it possible to optimise store operations and make them more sustainable. This includes waste management and predictive monitoring of refrigeration equipment to prevent losses. Store assortments and warehouse stocks are monitored by sensor systems and optimised by AI so that both waste and out-of-stock situations are avoided.

Technology

Energy requirements of traditional data centres vs. cloud data centres

According to the **International Energy Agency (IEA)**, data centres account for about 1 percent of global energy demand. Although the need for computer power is increasing due to digitalisation, there has been hardly any rise in worldwide electricity use by data centres in the last 10 years (Figure #). The reason is that traditional data centres with low energy efficiency are being replaced by cloud data centres and, increasingly, by hyperscale cloud data centres.

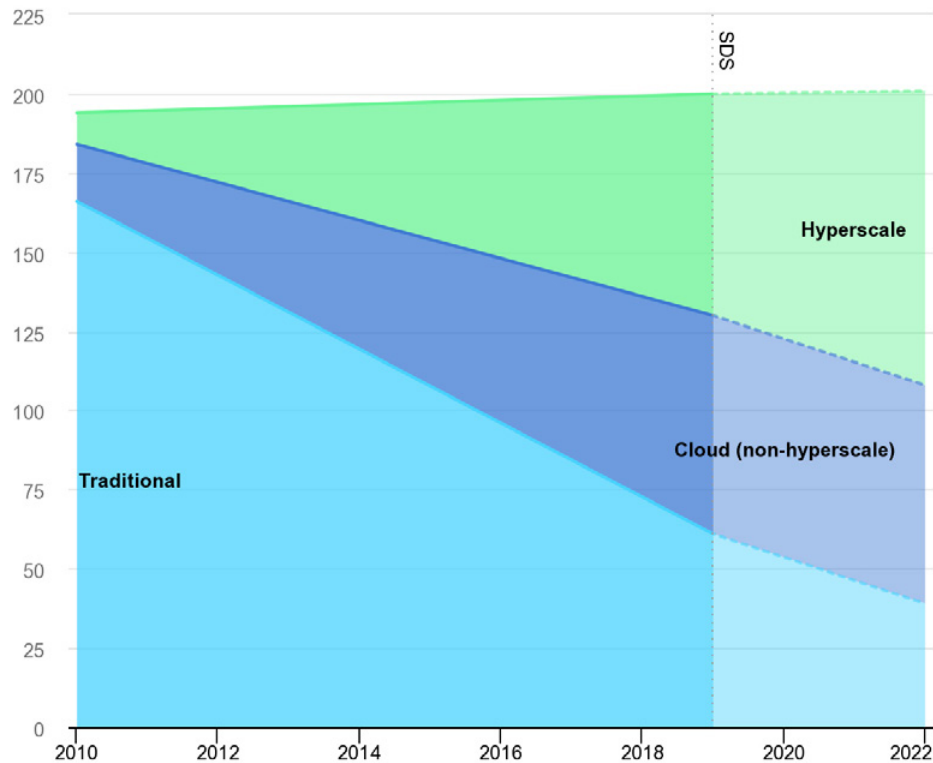
Hyperscale cloud data centres are very large, highly efficient data centres that operate at high capacity. Thanks to state-of-the-art hardware, they de-

liver more computing power per unit of energy than traditional data centres.

Through exact management of capacity, these data centres can better predict their energy requirements and plan their consumption. This means, for example, that they can use green electricity from a variety of suppliers to reduce their carbon footprint. Moreover, **modern data centres** are built in such a way that they are cooled by the environment instead of by air-conditioning equipment. Microsoft, for example, successfully operated an **underwater data centre** in a two-year pilot project in order to study the requirements.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)



Global data centre energy demand by data centre type (traditional on-premise, cloud non-hyperscale, cloud hyperscale), 2010–2022, IEA
Source: IEA

Digital solutions on the cloud edge

In view of these capabilities and the advantages they bring for sustainability, it would make sense for stores to operate their digital solutions in the cloud. Many, however, do not have sufficient bandwidth to make use of cloud solutions. A connection to the cloud is necessary in particular for computation-intensive tasks like processing data from IoT sensors, analysis of the data by means of AI and forecasts based on this. Applications like these would quickly bring stores to the limits of their bandwidth.

The answer to this problem is edge computing. Here the data generated by a sensor are aggregated

and processed by a special device (also called an appliance) right at the sensor or close by. The predictive ability of AI is transferred to the device and pre-installed so that it is available even without a connection to the cloud. A connection is needed only for the initial AI teaching process and later possible changes. This cuts bandwidth requirements considerably. An additional advantage of edge technology is that data can be processed in near-real time, without appreciable latency.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Store infrastructure and architecture

The infrastructure of a smart store is a key factor affecting the sustainability of digital solutions. It depends on the digital solutions in the store itself and on the solutions provided by the retail enterprise.

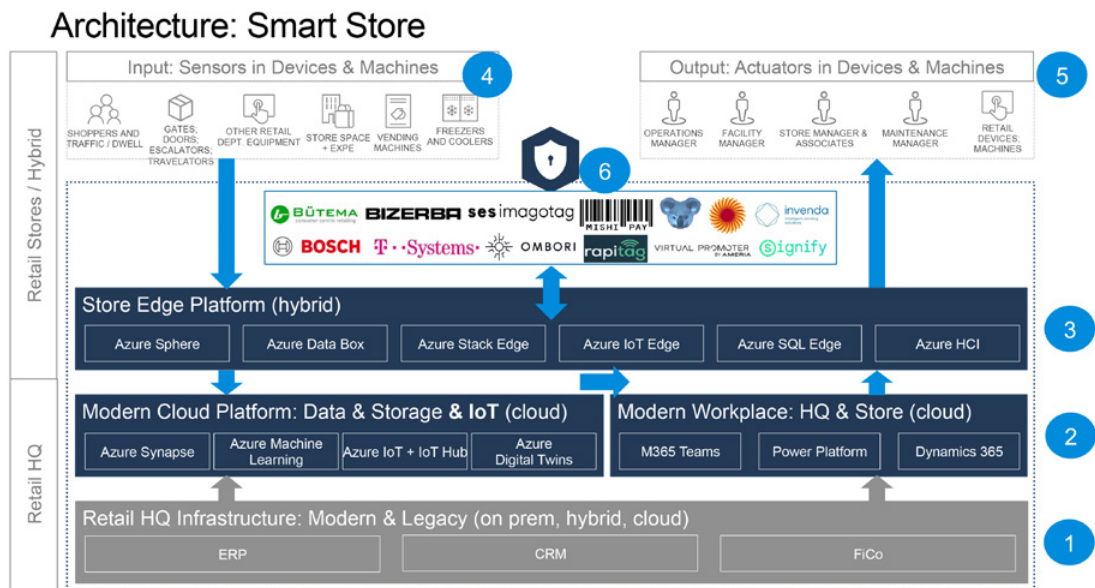
The graphic below shows an example of the architecture of a sustainable smart store.

HEADQUARTERS:

1. Retail enterprises typically have a large number of centrally located **core systems**, such as ERP/merchandise management, CRM and FiCo. Depending on their age, these systems run in a traditional data centre (on-premise), in a hybrid configuration or in the cloud.
2. In addition, retailers operate **modern cloud platforms**, for example for data. Usually there is also a **modern work platform** for use by headquarters as well as store staff.

STORE:

3. Stores have an **edge platform** for aggregation of IoT data, analysis by AI and creation of forecasts.
4. **IoT data** are provided by **sensors** in store equipment such as reverse vending machines, bread baking machines, doors and gates.
5. After aggregation of the IoT data and forecasting by means of AI on the store edge platform, tools and simple workflows on the **modern work platform** can be used to send **notifications** and instructions to store employees.
6. A variety of **sector-specific solutions** can utilise information from sensor systems, IoT and AI, enabling them also to benefit from processing on the store edge platform.



Architecture of a smart store with connection to headquarters
Source: Microsoft

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Results of the EHI Retailer Survey

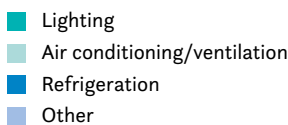
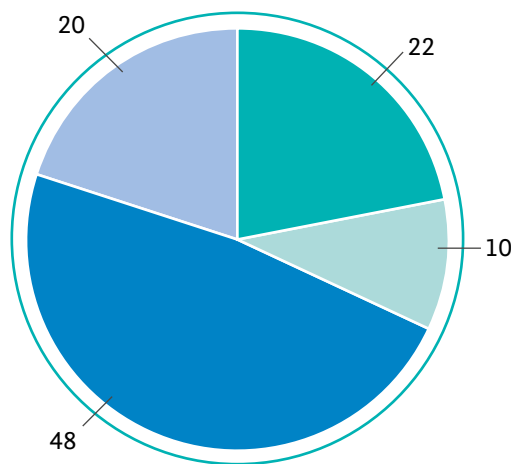
Retailers unanimously agree that technology will be able to make an enormous contribution to sustainable store concepts in the future. Although this is especially true for stores in the food sector with their comparatively high level of energy consumption,

there are also promising applications in the non-food sector. In food retail, refrigeration accounts for by far the largest share of energy consumption, whereas in non-food the most important category is lighting.

Breakdown of electricity consumption by categories – food retail

(Figure 1)

Shares in percent



Basis: 34 food retail chains, more than 27,000 stores, approx. 35 million sqm selling space

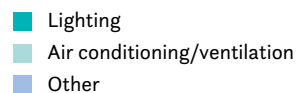
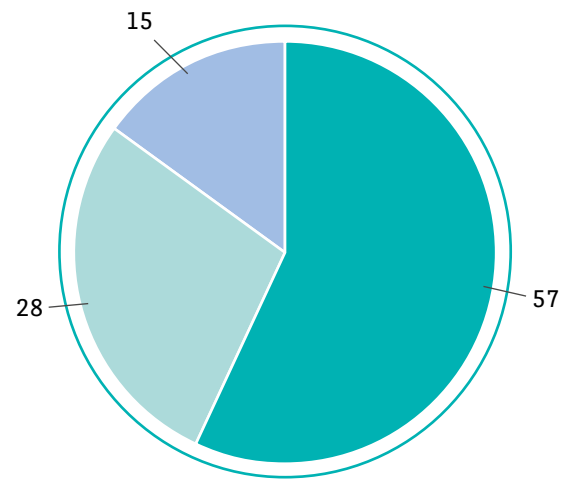
Energy Management in Retail 2020

Source: EHI

Breakdown of electricity consumption by categories – non-food retail

(Figure 2)

Shares in percent



Basis: 26 non-food retail chains, more than 11,000 stores, approx. 20 million sqm selling space

Energy Management in Retail 2020

Source: EHI

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Little involvement by retail IT departments

Although retailers are already using automated systems to monitor and control energy-consuming applications, they are nowhere near exhausting the technical possibilities. Responsibility for these activities, referred to here as smart energy management, often does not lie with the IT department but with facility management or the construction department. Moreover, there is often no uniform platform for giving an overall view.

Monitoring of certain applications is sometimes assigned to service providers like the manufacturers of refrigeration units. A comprehensive approach comprising smart, highly automated and

centralised energy management, including clear, user-friendly visualisation, is often named as a goal but not yet achieved.

BRIEF INFORMATION

Facts & Figures

The IT department is closely involved in energy management in 18 percent of companies.

Source: EHI: *Technology Trends in Retailing 2021*

Political encouragement for the use of technology

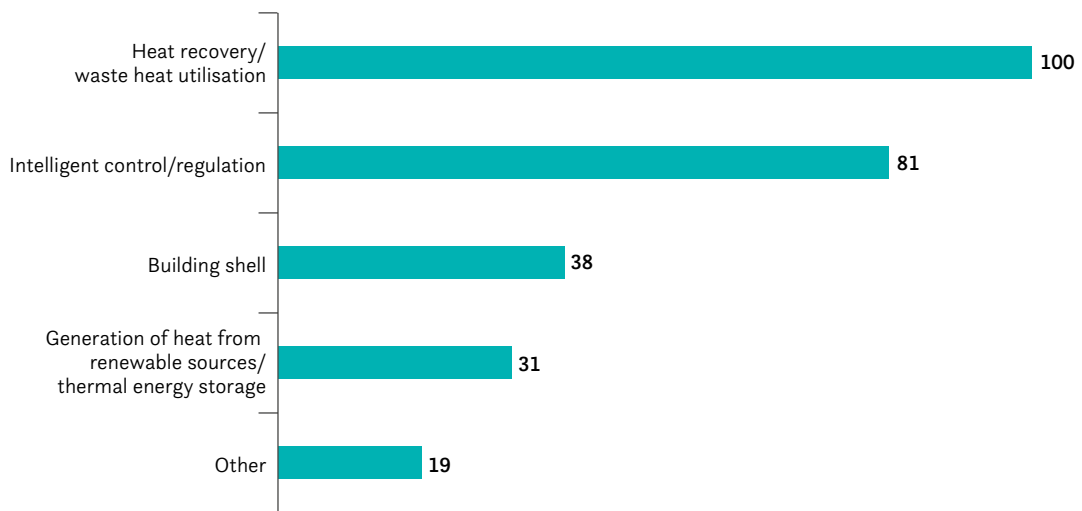
Political incentives can be expected to encourage the use of technology. Phased increases in the price of carbon emissions will stimulate investment in energy-efficient heating and the use of renewable energy sources. The effort and expense of control

and regulation will continually increase as volatile renewable energy takes on an ever greater role in electric power generation and the need grows for efficient heat management. Retailers will therefore increasingly have to rely on smart IT systems to

Measures to save heat energy – food retail

(Figure 3)

Shares in percent



Basis: 16 retail chains, approx. 11,000 stores, approx. 14 million sqm selling space; multiple answers possible
Energy Management in Retail 2020

Source: EHI

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

handle these complex tasks. Although 81 percent of the food retailers surveyed in the most recent EHI energy management study say they are already using smart control and regulation systems to save heat energy, it can be assumed that they could go a lot further.

In the present study on technology trends in retailing, CIOs and IT managers from 97 retail enter-

prises in Germany, Austria and Switzerland were asked about the most important trends and developments in the years ahead. For the reasons outlined above, the survey also covered the topic of smart energy management and the importance of sustainable store concepts from the technological point of view.

AI is still the most important trend for IT decision makers

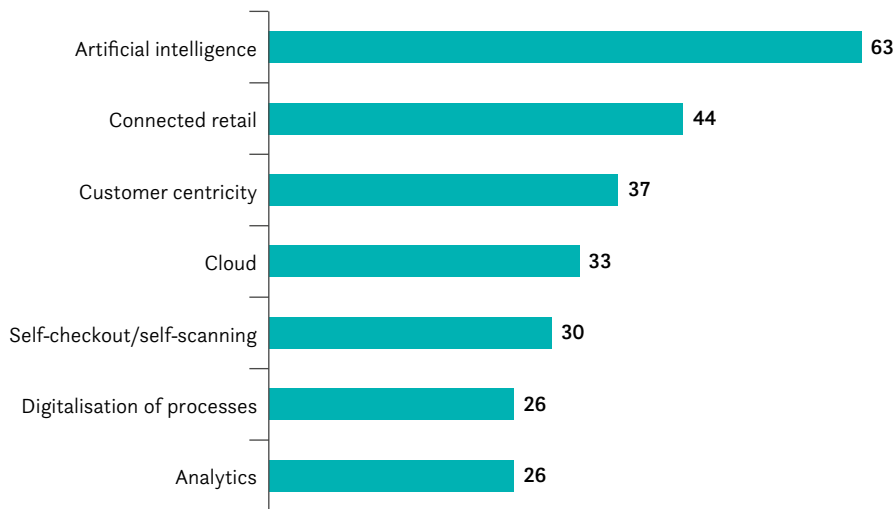
One of the main results of the study is that artificial intelligence continues to be seen as highly important for the future in the retail sector. Of the decision makers surveyed, 63 percent think that AI will play

an increasingly important role in various applications and have a lasting impact on many processes in the medium term.

Technology trends and projects

The most important technological trends in the next three years (Figure 4)

Shares in percent



n = 97

Technology Trends in Retailing 2021

Source: EHI

Here it should be noted that opinions often differ on the definition of AI. Some decision makers equate machine learning with AI, whereas others make a clear distinction. However, all agree that

self-teaching algorithms are growing in importance, especially when it comes to forecasting and replenishment, and that the applications are becoming increasingly intelligent and sophisticated.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Specific plans for smart energy management, IoT and electric vehicle charging stations

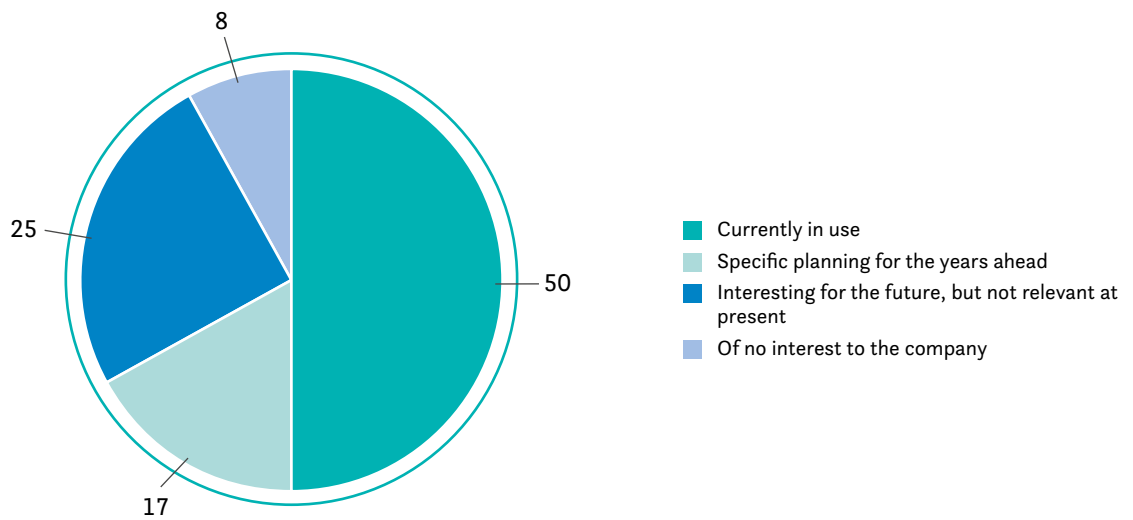
The interviewees were also asked about the status quo and their planning relating to new technologies. The focus here was on IoT, smart energy management and parking spaces with charging stations for electric vehicles. More than half reported that they were already using simple solutions. However, as already mentioned above, they often said that their

IT departments were only marginally involved in these matters and that other departments were the ones with responsibility. On the other hand, initial steps to establish comprehensive, highly sophisticated smart energy management with AI-supported applications can be observed, especially in the food sector.

Assessment of new technologies

Smart energy management
(Figure 5)

Shares in percent



n = 97
Technology Trends in Retailing 2021
Source: EHI

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

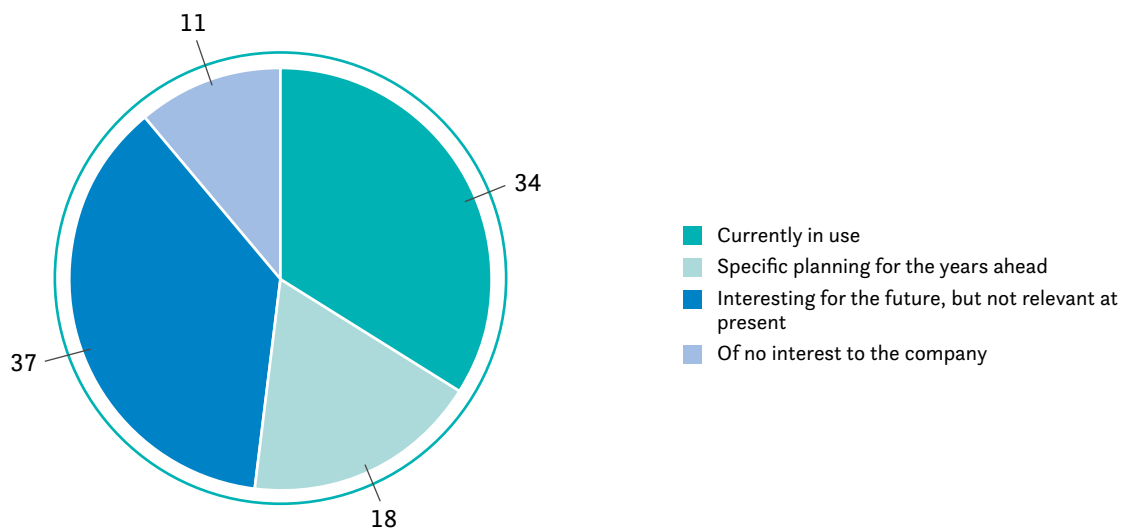
Closely connected with this is the assessment of IT decision makers concerning the Internet of Things (IoT) in stores. In the future, IoT applications can be expected to take on particular importance for monitoring refrigeration, lighting and other energy-intensive applications. Most of the panel participants are currently somewhat reserved on this issue. Even

so, 34 percent say that they are already using IoT technologies and a further 37 percent do not see them as relevant at present but think they could be interesting in the future. These results indicate a high potential in the medium term, and it will be interesting to watch developments in the years ahead.

Assessment of new technologies

Internet of Things
(Figure 6)

Shares in percent



n = 97
Technology Trends in Retailing 2021
Source: EHI

The CIOs and department heads were also asked to what extent they have implemented charging opportunities for customers with electric vehicles. Here it must be noted that some stores do not offer parking in the first place (for example, in inner cities) and some let other companies provide this service. However, 56 percent reported that they are al-

ready providing charging stations for their customers and a further 10 percent plan to do so in the near future. The technical challenge here will be to integrate this service in the store's IT infrastructure, for example by analysing usage behaviour or creating offers that are tailored to individual customers.

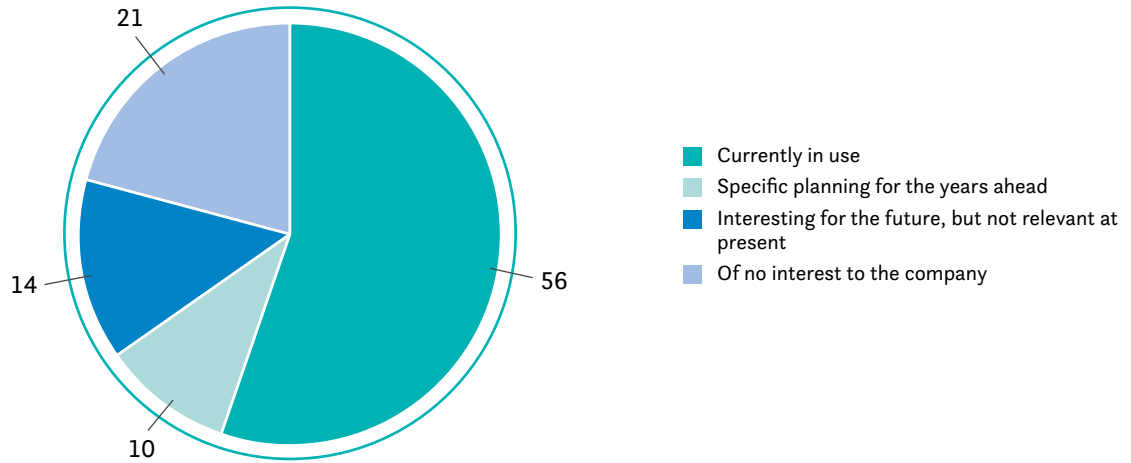
Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Assessment of new technologies

Parking spaces with electric vehicle charging stations
(Figure 7)

Shares in percent



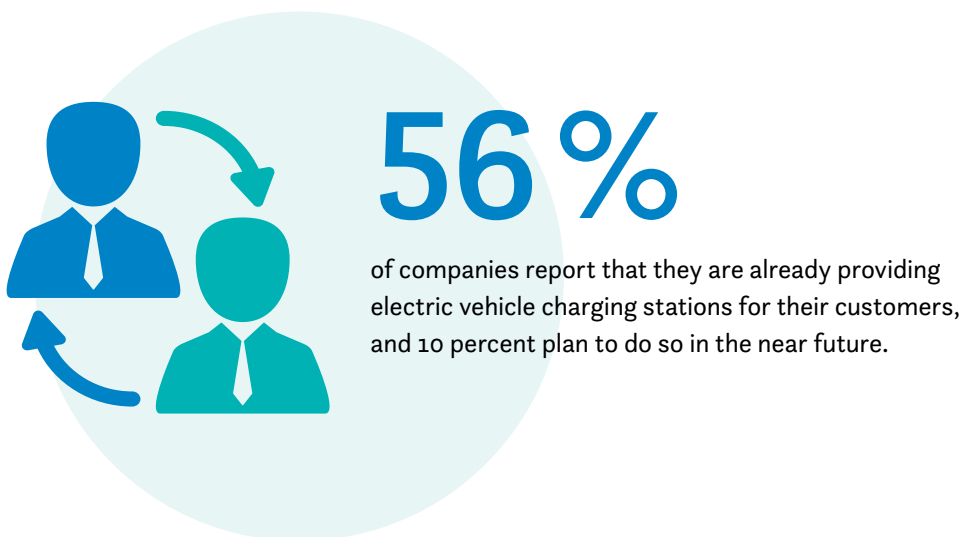
n = 97
Technology Trends in Retailing 2021
Source: EHI

As mentioned above, many IT departments are not (yet) involved in energy management. This can be expected to change in the years ahead, at least in food retail. A separate analysis of this sector shows that 33 percent of all decision makers surveyed already concern themselves with this topic, and according to many individual statements the trend is rising.

BRIEF INFORMATION

Facts & Figures

In the food retail sector, the IT departments in 33 percent of companies are closely involved in energy management. *Source: EHI: Technology Trends in Retailing 2021*



Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

The cloud as a basis for sustainable smart stores

In order to make meaningful use of applications based on AI and the IoT, companies need to put their IT infrastructure on a suitable foundation. Many are

increasingly using a cloud platform, which can provide a wide range of solutions and services.

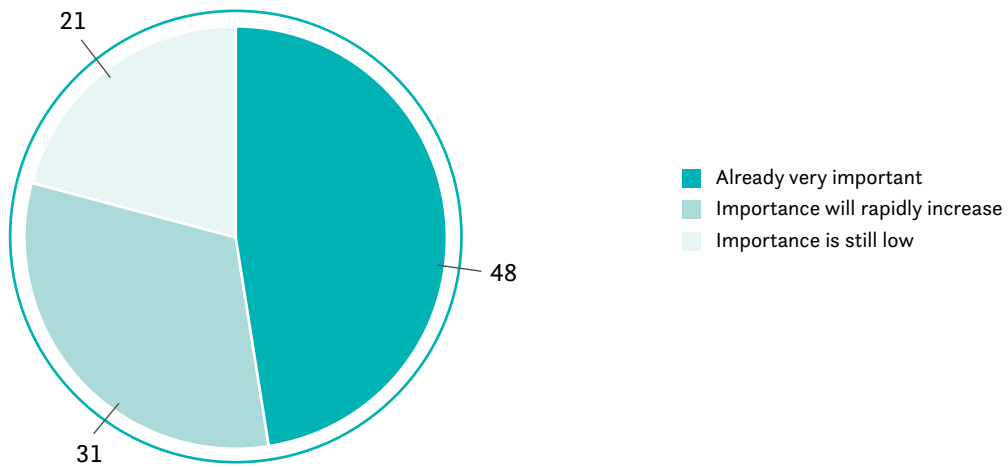
“Cloud-based applications are already very important for 48 percent of retailers.”

Ulrich Spaan, Member of the Management Board
EHI Retail Institute

Cloud

Importance of cloud-based applications in companies (Figure 8)

Shares in percent



n = 97
Technology Trends in Retailing 2021
Source: EHI

The former scepticism towards cloud solutions in this sector is yielding to a friendly attitude, and there are many reasons for this. For one thing, retailers want greater scalability when they roll out new solutions. Quick and simple implementation has become a critical factor for success, so many compa-

nies prefer to avoid complicated in-house installations and instead get flexible, up-to-date services from the cloud. Another reason is that they can focus on their core strengths. In addition, resource conservation and energy efficiency have been mentioned as reasons.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

“Resource conservation and energy efficiency were often mentioned as relevant factors, but not as decisive ones.”

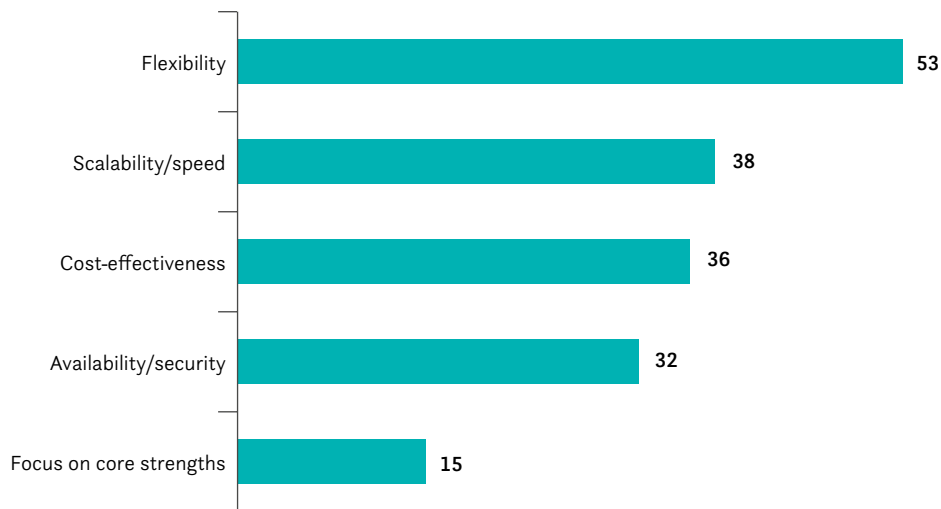
Çetin Acar, Project Manager, Research IT
EHI Retail Institute

Reasons for cloud use

What are the most important drivers for the use of cloud-based applications?

(Figure 9)

Shares in percent



n = 97, multiple answers possible
Technology Trends in Retailing 2021

Source: EHI

Some retailers are trying to reduce the load on bandwidth from digitalisation and taking advantage of

edge technology, which keeps artificial intelligence locally available.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Dynamic pricing to reduce waste

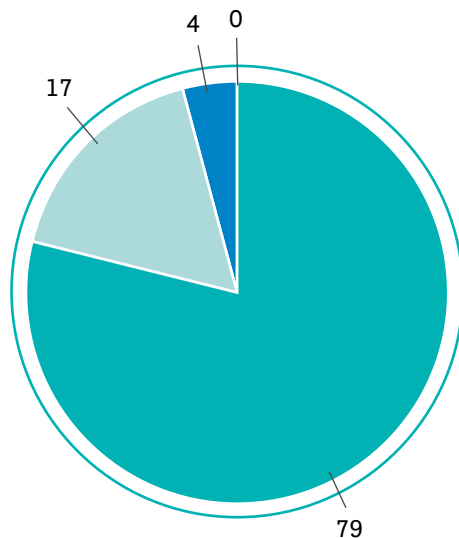
In recent years, electronic shelf labelling (ESL) has become much more common among food retailers in German-speaking countries. Many large retail enterprises have introduced this technology over wide areas, and leading discounters are taking a very close look at it. One advantage of ESL is that it reduces handling effort because price labels no longer have to be placed by hand. Another is that prices can be adjusted as needed during the day.

Although bricks-and-mortar stores have not come nearly as far as online retailers when it comes to dynamic pricing, there are applications for perishable goods that could make a very important contribution to sustainability. Smart digital control of prices for fruits and vegetables can cut back on waste and reduce the quantities of goods that have to be thrown out at the end of the day.

Electronic shelf labelling

The use of electronic labels in food retail
(Figure 10)

Shares in percent



- Already in use
- Project is planned
- Under observation
- No projects planned

- Numerous implementations are currently in the pilot stage.
- However, 54 percent of food retailers are planning to expand their use.

n = 97
Technology Trends in Retailing 2021

Source: EHI

Navigation

Contents | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Digital Sustainability Solutions for the Retail Industry

The following pages feature a range of digital sustainability solutions for retailers and manufacturers offered by Microsoft customers and partners. They will be presented according to the typical areas of focus and action listed on [page 8](#). What all the solutions have in common is that they are based on the Microsoft platform.

This **compendium** comprises **46 solutions**, including 29 customer stories and 17 solutions pro-

posed by Microsoft and its partners in the following areas: **Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy**.

The bottom of each page features a **Quick Navigation** bar to help move between the different areas. The Microsoft customer stories and partner solutions are also listed in the overview in the **Appendix**.

Headquarters

Cloud infrastructure & digital collaboration

MICROSOFT SUSTAINABILITY CALCULATOR A study on the **Carbon Benefits of Cloud Computing** (MSFT and WSP, updated 2020) found that the **Microsoft Cloud is up to 93 percent more energy efficient** than traditional on-premises data centres. When renewable energy is taken into account, the Microsoft Cloud is between 72 and 98 percent more carbon efficient than traditional data centres. These improvements can be attributed to IT operational

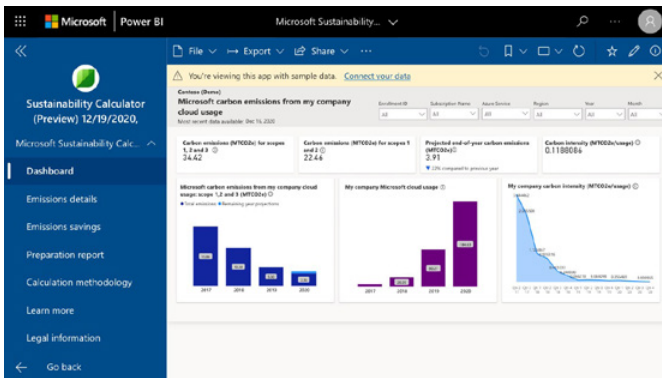
efficiency, modern IT equipment and infrastructure, and renewable energy.

The **Microsoft Sustainability Calculator** is a tool that provides companies with a transparent overview of their carbon footprint when using the **Azure** and **Dynamics365** clouds. The tool details both the direct and indirect carbon emissions a company generates when it uses the Microsoft Cloud.

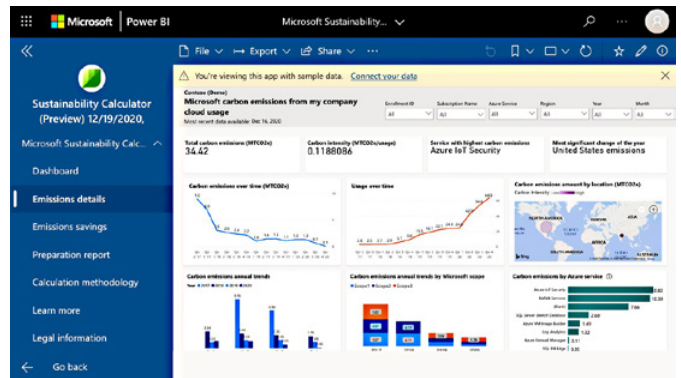
Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

MSC overview of a company’s carbon emissions from its Microsoft Cloud usage

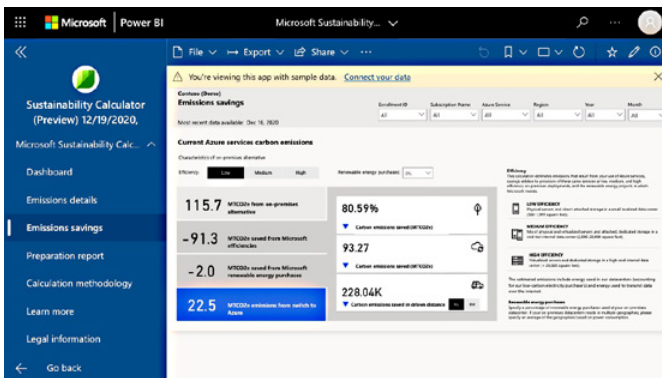


Source: Microsoft

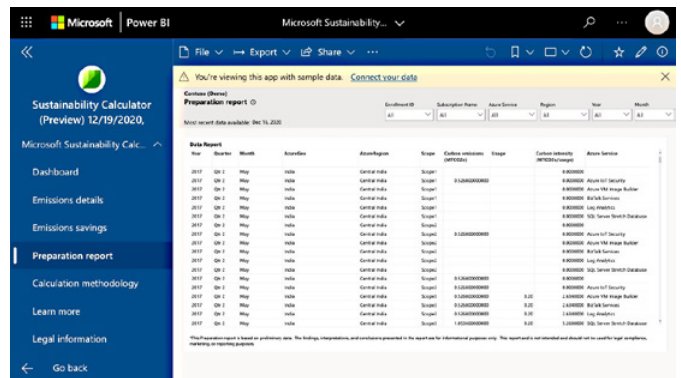


Source: Microsoft

MSC comparison of a company’s cloud/on-premises carbon emissions and detailed emissions report



Source: Microsoft



Source: Microsoft

The tool provides an overview of the carbon emissions a company generates using the Microsoft Cloud. The data are made available either in aggregate form or in detail so that the company can use them in its sustainability reports.

The MSC furthermore compares the carbon emissions generated using the Microsoft Cloud with those produced using a generic traditional data centre (Figure). For a more accurate comparison of carbon emissions from cloud and on-premises data centres, a separate calculation can be made using the electricity consumption of a traditional data centre:

- Determine the electricity use of a traditional data centre over a period of time (kWh)

- Multiply this by the carbon intensity of the electricity available (gCO₂eq/kWh) in the corresponding region to get the equivalent carbon emissions of the data centre over the period of time
- Visit the [electricityMap](#) or consult documents from local energy providers to find out the carbon intensity of the electricity available (gCO₂eq/kWh) in any given region.

The MSC is currently available as a trial version for Azure enterprise customers with an existing account and will be made generally available in July 2021; further updates beyond Azure to the other Microsoft Clouds are also expected at this time.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

REMOTE WORK AND PROCESS AUTOMATION (IKEA & MICROSOFT) Digital productivity tools enable retail company employees, from the central office to the front line, to work together virtually and automate operational processes. This means greater efficiency and a smaller carbon footprint.

IKEA uses **Microsoft 365** for its 166,000 employees. IKEA staff were quick to adopt Microsoft Teams for internal and external collaboration and store employees in particular were very pleased with the mobile Teams app. Adopting Microsoft Teams helped the company support its sustainabil-

ity efforts by reducing paper-based processes and replacing travel with digital collaboration. “Using Teams makes our life in the store easier and helps us meet our sustainability goals because we **don’t need to use as much paper**,” explains Fabian Haerberlein, Deputy Marketing Manager at IKEA Kungens Kurva, the largest IKEA store in the world. “We’ve calculated that in **this store, we could save SEK 364,000 (around EUR 36,000)** by replacing our current scheduling process with Shifts. And you can imagine how much we could save as a company if we used Shifts at IKEA stores all over the world.”

Sustainability tracking & reporting

MASTER DATA MANAGEMENT FOR SUSTAINABLE PROCESSES (UNILEVER DACH & SYSTRION) Efficient master data management is important for manufacturers and retail companies, not only because it forms the basis of many of their core processes but also because it is essential to successfully monitor sustainability. The benefits of digital master data management solutions are configurable data import, and constant monitoring of data quality at maximum scalability using flexible error analysis and reports. Data errors are indicated clearly so that they can be corrected quickly, improving data quality in the master data pool. **Unilever DACH** used the **Systrion synfoxx** solution to **raise the quality of its master data from less than 50 percent to more than 99.2 percent**, effectively halving efforts and redundancies due to errors along the entire supply chain.

SUSTAINABILITY RATINGS FOR COMPANIES (LVMH & ECOVADIS) **EcoVadis** develops sustainability ratings for companies and oversees a global network of more than 75,000 rated companies. As part of its sustainability assessment, EcoVadis fo-

cuses on how well a company has integrated the sustainability/CSR principles in its business and management models. The luxury goods company **LVMH Moët Hennessy Louis Vuitton SE** uses the EcoVadis solution to monitor the sustainability of its many suppliers for its business activities in wines & spirits, fashion & leather goods, perfumes & cosmetics, watches & jewellery, and selective retailing. “New regulations can be helpful because until recently sustainability was something that each LVMH House had to approach on its own. Now, with Sapin II and “Devoir de vigilance” (Duty of Care) regulations, especially in France, the group as a whole is also responsible for what happens at the subsidiary level. This means we need to create more links between what can be done at House level, the business line level, or at the group level. It also strengthens all the synergies we want to create between our subsidiaries. This is a very positive thing for us. The advice I would give about using EcoVadis is that it can help you to make a quick and fairly accurate mapping of the suppliers who are at risk,” says LVMH Chief Procurement Officer Christian Galichon.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

SUSTAINABILITY REPORTS – PLATFORMS FOR DOCUMENTATION & MANAGEMENT

A great number of data are required to publish certified sustainability reports and these must be constantly updated to show that progress is being made towards meeting sustainability goals. This means that any gaps in reporting or irregularities, for example concerning supplier data, must be quickly identified and addressed. There are many digital platforms, with differing focal points, to do just this:

READY-MADE PLATFORMS:

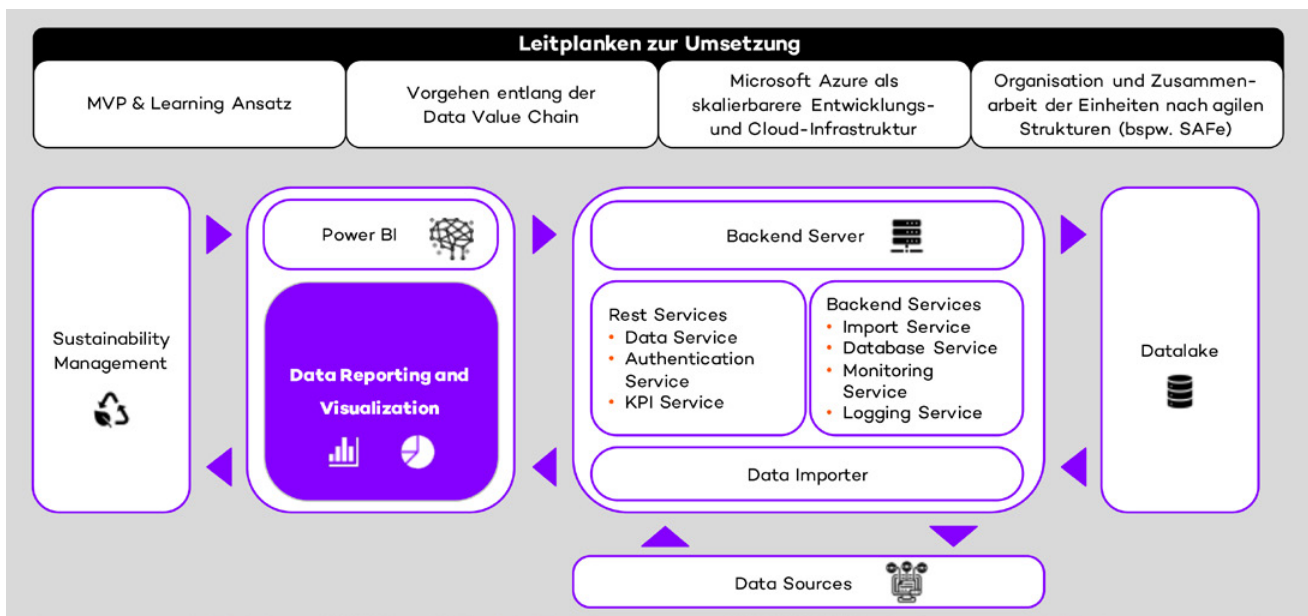
- **ESGeo sustainability intelligence solution:** Evaluates ESG-related (environmental, social, governance) risks and opportunities, integrates new ESG factors, and streamlines sustainability reporting with a transparent disclosure process.

- **IMPACT solution:** Enables automated documentation, reporting and data collection. The reports document the sustainability strategy using the SDGs and are certified according to CDP and GRI standards.

- **Stratsys sustainability plan:** Helps plan and document sustainability strategies. Sustainability key figures can be gathered in one place, responsibilities allocated and a clear link between activities and strategy created.

CUSTOM SOLUTION:

- **Diconium custom sustainability dashboard:** The advantage of a custom solution is that it can flexibly integrate pre-existing source systems, and automatically incorporate data via company-specific workflows and display them in user-friendly dashboards together with information on reaching sustainability goals.



Example components of a custom solution for sustainability reporting
Source: Diconium

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Central smart energy management

BUILDING MANAGEMENT PLATFORM (MICROSOFT & ICONICS) The **Microsoft headquarters** in Redmond currently comprises 125 buildings, 35,000 pieces of equipment and 500,000 data points. Close to 15 million sqm of office and laboratory space are spread over 500 hectares. The campus used many different building systems with a peak energy consumption of 100 MW and a yearly cost of USD 60 million.

In 2018, Microsoft decided to integrate the different systems to make remote monitoring and management possible. This is where the **ICONICS Genesys64** automation solution came into play, which connects workshops and buildings with company business systems. A comprehensive building management platform was built on the **Azure** platform with **Power BI, SQL Server** and **Dynamics 365 Field Service**. The solution can reduce energy usage, improve building performance and increase work efficiency. The campus and its 59,000 users was able to **reduce its energy usage by 25 percent** and achieve **ROI within 2 years**.

Further building and energy management platforms:

- **Deutsche Telekom Building Monitoring & Analytics** makes it possible to manage buildings sustainably. Sensors are used to capture and visualise energy consumption and the use of building space. In addition to monitoring functions, the application also provides analytics to better use resources and save energy. **ISS**, a leading global provider of facility services, uses the solution to use available space, building technology and resources more efficiently, improve comfort parameters and lower costs.
- **ABB OPTIMAX® for industrials and commercials:** Sustainably improves the energy efficiency of sites and manages all elements of a microgrid such as energy production, energy storage, energy distribution, building automation and energy services and marketing.

- **Johnson Controls OpenBlue Enterprise Management:** Monitors and manages devices, buildings and companies. Proactively analyses building data to improve performance with dashboard and app for control.
- **Bosch Energy Platform:** Connects to IoT devices in buildings such as existing meters, sensors, and machines and evaluates data for measurement, control and analysis in order to improve energy efficiency.

WATER MANAGEMENT (ECOLAB, TRUCOST, MICROSOFT) Global water resources are being depleted. As such, it is becoming increasingly important for companies to view water as a company resource and to pursue risk minimisation, performance maximisation and cost optimisation strategies for this resource if they wish to ensure their growth. Microsoft has joined forces with **Ecolab** and **S&P Trucost** to develop two tools to help companies manage water resources and estimate water risks:

- The **Smart Water Navigator** is a comprehensive way to manage water. Following a simple 13 question evaluation, a practical guide is generated that presents intelligent, sustainable water management practices for individual plants, buildings and factories.
- The **Water Risk Monetizer** provides support in assessing water risks and the impact of reduced water availability and quality on operating costs and revenue. Based on risk-adjusted water prices for incoming and outgoing water, potential revenue at risk is calculated to identify risks and enable informed decisions about strategies and investments.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

CENTRAL ENERGY MANAGEMENT AS A VIRTUAL POWER PLANT (ABB) With rising energy costs, companies are increasingly looking to optimise their energy consumption and produce their own power, for example using solar panels on store roofs or generating combined heat and power in store. To manage various energy resources and costs from one location, central energy management solutions, such as the **ABB Ability™ OPTIMAX® for Virtual Power Plants**, are being used. It aggregates and optimises decentralised energy resources on and off the company grid into a virtual power plant in order to cover local or regional needs. Energy resources could

be wind, sun, combined heat and power, biogas, hydro, fossil steam, power-to-heat or diesel engines. Energy storage devices such as batteries, thermal storage devices, and compressed air and pump storage devices can also be integrated into the virtual power plant. The solution enables the **real-time optimisation of energy resources** for example through Power Pool Balancing. Trade and portfolio management furthermore helps operators understand and manage **trades of surplus energy**.

Other Microsoft partners that offer similar solutions, also for single energy sources, include: **Avnet**, **Axonize**, **OrxaGrid**, **Prediktor AS**, **Smarkia**.

Supply Chain & Logistics

Supply chain transparency

PLATFORM FOR SUSTAINABLE PROCUREMENT (INTERMARCHÉ & SGS TRANSPARENCY ONE) It is becoming increasingly important for manufacturers and retailers to be able to guarantee the quality and traceability of their products. Tighter regulations and greater consumer demand for transparency require digital tools to manage and control product traceability throughout the supply chain, from primary production to end consumer.

Intermarché used **Transparency One's** solution to identify, analyse, and monitor all suppliers, components, and production sites in their supply chains. The tool uses real-time supply chain data to **identify product origins and reduce risks**. Users can review all the facilities in their supply chain and ensure their suppliers comply with regulations for product safety, sustainability, and social responsibility.

INTELLIGENT DEMAND PLANNING TO REDUCE WASTE (BLUE YONDER) Globally, supply chains are becoming increasingly complex and the COVID-19 pandemic has only made matters worse. At the same time, consumer demands for personalised products and services are growing, providing retailers and manufacturers with the perfect opportunity to separate themselves from the competition.

A solution for intelligent demand planning uses demand-driving variables and correlates these with the factors required to meet demand in order to create customer value and use resources more efficiently. The aim is to be able to react flexibly to customer demands while also reducing waste and returns.

The Blue Yonder solution **Luminate Demand Edge** forecasts the short- and long-term turnover of B2B and B2C products at SKU level for further use. The forecast combines time-series approaches

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

with artificial intelligence and has proved itself to be stable and reliable particularly in the face of the COVID-19 pandemic. Product characteristics can also be used to make forecasts for new products that have yet to be marketed. Blue Yonder's years of experience mean a **30 percent decrease in out-of-stock rates, forecast accuracy levels of up to 95 percent and up to 10 percent less waste.**

SERIALISED PACKAGING IN THE SUPPLY CHAIN (DIGIMARC) The **Digimarc Barcode** is a barcode that cannot be seen by the human eye. It is integrated into the packaging's design and applied to its entire surface. These digital watermarks can be placed on product packaging, plastic containers or textiles. This can be done using a variety of methods ranging from digital and inkjet printing to laser etching systems. The barcodes contain unique, serialised or user-defined identifiers to enable the traceability of consumer brands at batch, lot and item level and provides real-time insight into production locations in warehouses and distribution centres. This makes recalls easier to manage, inventory more accurate and work with distributors more efficient, ultimately resulting in the **reduction of waste.** According to

Digimarc, Digimarc Barcodes **save up to 69 percent of ink** compared with traditional UPC/EAN barcodes.

TRACK & TRACE CONSUMER GOODS (BOSCH, ARVATO) Blockchain technology can be used to track goods from producer to retailer. The advantage here is that the data certificate, which is generated along the supply chain, cannot be altered.

The **Bosch Truefood+** solution uses blockchain technology to record key details on origin, transport and production. For this it uses sensors and IoT technology to monitor conditions from farm to truck. The data are made available to all involved, from farmers and agricultural producers to logistics providers, retailers and consumers. Food recalls are made possible with precise root cause identification, leading to **reduced recall times and costs.**

Arvato offers a further solution to track & trace consumer goods: In addition to traceability, the solution helps to avoid replicas in the supply chain and creates the product transparency necessary to combat forgery within the entire manufacturing and delivery process (end-to-end).

Optimised logistics processes

REAL-TIME SUPPLY CHAIN VISIBILITY (MICROSOFT & CH ROBINSON) To avoid disruptions, global supply chains and contents must be transparent – ideally in real time. Solutions for digital supply chain management integrate all material, product, person and information flows over different logistics channels from raw materials to end customers to improve efficiency related to costs, synergies and sustainability.

The **Microsoft Corporation** uses **CH Robinson Navisphere Vision**, based on **Azure IoT Central** to

collate information on the global Microsoft supply chain from external providers, suppliers and other systems. The platform combines real-time information on orders and deliveries with up-to-date transport information and external factors that affect the supply chain. With the use of AI/machine learning, Navisphere Vision makes predictions of possible disruptions in the supply chain and provides alternatives to avoid these. This also **reduces empty miles and carbon emissions.**

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

PREDICTIVE VISIBILITY FROM THE FIRST TO THE LAST MILE (DHL & FAR EYE)

As ecommerce and direct-to-consumer shipping continue to grow, so too does the importance of real-time logistics monitoring. To ensure seamless delivery, the delivery status must be visible to end consumers, shippers at carrier level and supply chain managers at courier level. Depending on the model, store-to-customer visibility and transparency are also necessary for SLA adherence. IT silos and boundaries across multiple supply chain systems must be transcended to mitigate blind spots. Real-time information also improves transparency for couriers.

DHL uses the **FarEye platform** to drop off and pick up packages at DHL parcel shops, flexibly conduct last-mile pickup and seamlessly integrate existing systems. The solution uses AI-based automatic routing for faster deliveries and accurate ETA and is available worldwide. The solution enabled DHL to increase the **productivity of its delivery team by 15 percent**, and **double customer satisfaction** all while **reducing operational costs** and raising profits.

ENVIRONMENTALLY SENSITIVE FLEET MANAGEMENT (T-SYSTEMS INTERNATIONAL) High fuel consumption in transport logistics equals high carbon emissions, while price pressure and maintenance costs work to the detriment of expensive telematics systems. Add subcontractors and heterogeneous fleets into the mix and a complexity arises that makes optimal routing and fleet mix near im-

possible. The **T-Systems low-carbon mobility management** solution relies on a mobile device and corresponding app. The app analyses driving behaviour and calculates the efficiency profile in real time. A trip summary provides information on how to optimise driving behaviour, effectively **reducing fuel consumption and carbon emissions**.

LAST-MILE ROUTE OPTIMISATION (T-SYSTEMS INTERNATIONAL) More than half of delivery costs are incurred in the last mile. Customers expect reliability when it comes to dispatch and delivery, ideally in the form of real-time data. Trips should also be efficient and that means avoiding empty or unnecessary journeys.

The **T-Systems Last Mile Delivery & Route Optimisation** solution uses geographic information systems (GIS) to dynamically plan and optimise last-mile delivery routes. It also provides real-time communication between driver and recipient as well as an information system for customer support and delivery. Dynamic route optimisation and efficient driver support mean a customer- and environmentally-friendly transport chain.

GOODS TRACKING (DEUTSCHE TELEKOM IOT) Transporting fresh, ultra-fresh and frozen goods requires temperatures to be constantly monitored – or risk spoilage and other losses. A networked hardware sensor (tracker) sends signals when a delivery leaves its planned position, an unexpected shock occurs or the temperature changes inside the delivery container.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion



Close-up of a Low Cost Tracker and on a pallet.
Source: Deutsche Telekom

The **Telekom Low Cost Tracker** is 10 cm long and 3 cm high and uses energy-saving mobile radio technology, which means that the batteries last up to five years. Because the tracker is inexpensive it can also be used to track infrequent or irregular deliveries. Using WLAN or mobile radio, the low-cost tracker localises the goods with an accuracy of up to 50 metres. The transmission interval is freely

configurable and data are transmitted within a fixed time frame. The tracker also sends notifications of spontaneous events such as unplanned vibrations or changes in temperature. The Low Cost Tracker can be quickly and easily attached by screwing, riveting or gluing. The housing is waterproof and robust.

Product Range & Production

Sustainable production

SUSTAINABLE AGRICULTURE (MICROSOFT & VARIOUS PARTNERS) Combining sensor data and cloud technology can help ensure the basic provision of food. According to the United Nations, an estimated 9.7 billion people will inhabit the earth by 2050. In order to meet the needs of a growing population, existing agricultural lands need to be used more intelligently. This is known as “precision agriculture”. To optimise irrigation systems, for example, IoT sensors can be used to measure soil moisture and correlate the results with weather forecasts and other influencing factors. AI technology can then be used to forecast and control the amount of

water required per area and crop throughout the day, meaning water is used more efficiently and economically.

However, determining how to maximise output for each farm requires a huge amount of data to be analysed. That’s why Microsoft launched its **AI for Earth** program, which makes the Microsoft Cloud and AI tools available to anyone who is working to solve global environmental challenges. To achieve this, the engineering and data science team releases technical resources such as open-source tools, models, infrastructure, data, and APIs.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion



How Cloud Agronomics works

Source: Microsoft

This results in digital tools for agriculture. Below are a few examples that are already available as part of the AI for Earth program:

- **Cloud Agronomics:** Uses remote-sensing technology and AI to provide growers with insights into their crops and soil. Manned aircraft fitted with custom hyperspectral imaging apparatuses collect 300 times more data per pixel than satellites. The data are sent to **Azure**, where georeferencing, calibration, and analysis algorithms convert the raw data into insights. This enables proactive analytics to lower greenhouse gas emissions and spur sustainable food production.
- **AgriMetrics:** A data marketplace that connects data and organisations across the food and farming sector to help create a more productive and sustainable food system. Data owners can share and monetise data, and innovators can access critical information in a usable format. AI helps connect valuable agricultural and environmental data sets within the marketplace platform, providing data quickly and cost-effectively.
- **Ag-Analytics:** Combines data from farm equipment, satellite imagery, and weather forecasts in the cloud to provide precision recommendations to farmers. Data is collected from tractor sensors, satellites, and remote sensors to give farmers an

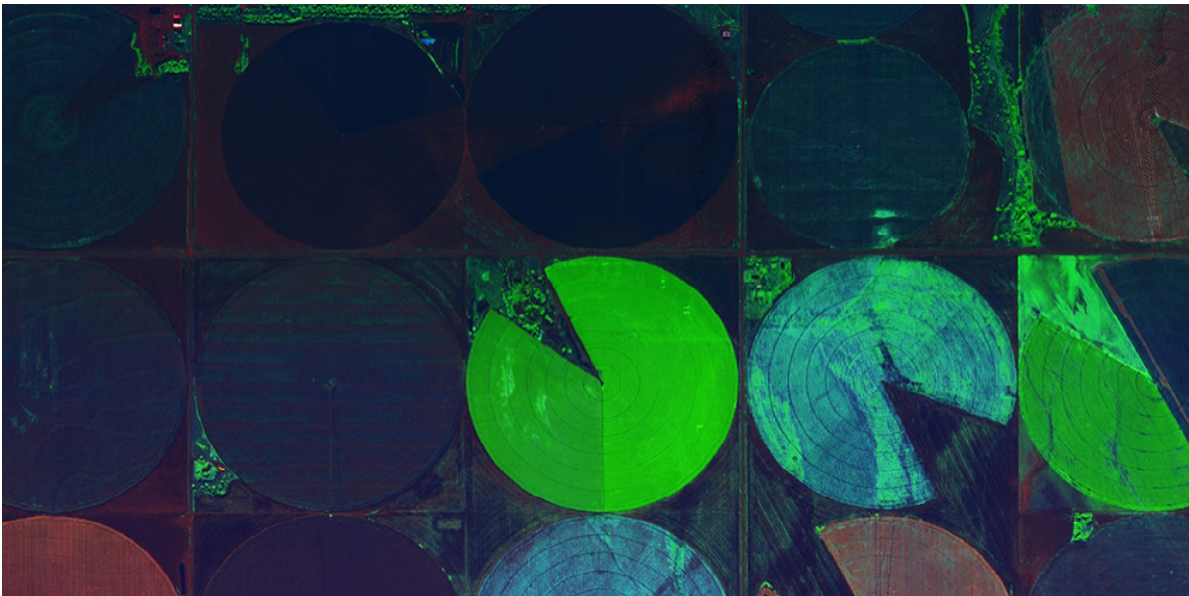
Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

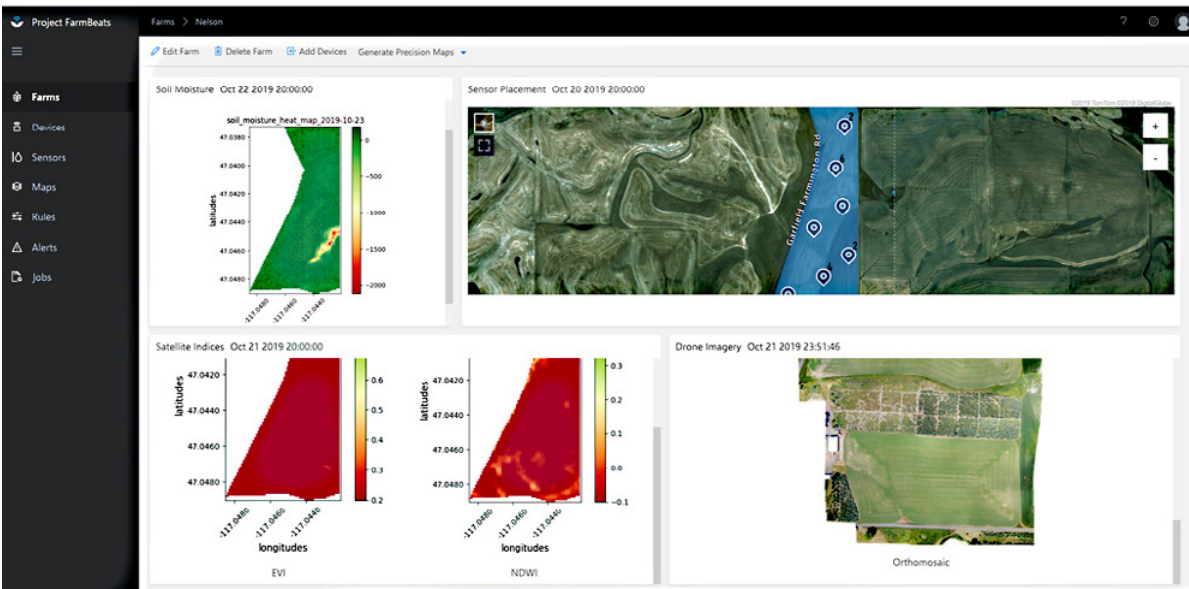
accurate picture of their land so they can manage it more sustainably. Ag-Analytics® is developing APIs that can be hosted on **Azure** using Microsoft technologies to help farmers access these data layers.

- **Azure FarmBeats:** Makes it possible to aggregate agricultural data sets and evaluate them using pre-built AI models. FarmBeats assesses farm health using a vegetation index and water index

based on satellite imagery and provides recommendations on how many sensors to use and where to place them. The solution tracks farm conditions by visualising ground data collected by sensors, generates soil moisture maps based on the fusion of satellite and sensor data and provides information on the operational status of individual areas or farms.



Cloud Agronomics map showing crop conditions per field
Source: Microsoft



Azure FarmBeats dashboard with drone imagery and AI model-generated precision maps showing soil moisture and sensor placement
Source: Microsoft

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion



Farm in Wisconsin, USA, affiliated with Land O'Lakes
Source: Land O'Lakes

SMART FARMING FOR SUSTAINABLE CROPPING (LAND O'LAKES & MICROSOFT) The American agricultural cooperative **Land O'Lakes** combines more than 3,600 dairy farmers and 850 member co-operatives with more than 300,000 agricultural producers. Land O'Lakes Inc. and Microsoft joined forces as part of a **strategic alliance** to pioneer new innovations in agriculture, enhance the supply chain, and establish **sustainability practices for farmers**. As one of the largest agricultural cooperatives in the USA with around 600,000 km² of productive cropland, Land O'Lakes has a unique understanding of farmers' needs for data-based tools that can be used in rural areas without high-speed internet.

As part of the strategic alliance, Land O'Lakes migrated the majority of the company's IT infrastructure onto **Azure**. The company uses **Microsoft 365 and Teams** for its workforce for collaboration and communication across the entire cooperative. The companies will create a series of tools for dairy farmers on Azure and bring them together under one unified architecture based on **Azure Farm-Beats**. The Digital Dairy solution, for example, uses edge computing and AI to capture and evaluate data from farms with poor internet coverage. The digital tools will help farmers with their **production planning and ensure the traceability** of milk and milk products.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

Product range optimisation for waste reduction

SEASONAL PRICE REDUCTIONS TO MINIMISE END-OF-SEASON WASTE (ORSAY & BLUE YONDER) Fashion retailers need to react early to changing seasonal collections and apply optimised central markdowns if they want to avoid deep discounts or excess stock at the end of the season. **Orsay** used

Blue Yonder's Luminate Clearance Price solution, which automatically generates AI-based forecasts and takes account of factors such as competitive prices and cannibalisation effects. Within the **first year**, Orsay was able to achieve a **10 percent improvement on stock per discount percentage**.

Process optimisation in production

FOOD PROCESSING WITH SMART WATER COOLING (ARCHER DANIELS MIDLAND & ECOLAB)

The American food and agriculture company **Archer Daniels Midland Company (ADM)** operates over 270 plants worldwide. ADM has many large agricultural processing plants that require critical water-based cooling systems. That's why it is essential for ADM to identify and implement methods to save water. ADM used **Ecolab's 3D TRASAR Technology** to equip remote monitoring, reporting and alarming systems with smart sensor technology, a touch screen user interface, improved connectivity and seamless integration. The technology helps ADM reduce, reuse and recycle water within its plants and use greywater (recycled water) for its processes, increasing water resiliency at the local level. **This saves 8.7 million cubic metres of drinking water, 35,000 tonnes of carbon dioxide and around 4,700 MWh of energy each year.**

INTELLIGENT MANUFACTURING FOR OPTIMISED ENERGY CONSUMPTION (BÜHLER & MICROSOFT)

The **Bühler Group** is a Swiss multinational and global market-leader in technology and processes

for transforming grain into flour and animal feed, the production of pasta and chocolate, die casting, wet grinding and surface coating. With the help of the Bühler Insights platform based on **Azure IoT** and **Microsoft Azure Data Explorer**, Bühler's customers are finding new ways to optimise their operations, reduce waste and energy usage, and increase output.

By connecting their industrial equipment and automation software to the Bühler Insights platform, Bühler's customers facilitate the daily transmission of millions of telemetry messages via **Microsoft Azure Data Explorer**. Using a series of microservice application programming interfaces (APIs), customers can access and explore their technology data at a granular level. Key performance indicators (KPIs) and benchmarks provide further access to the key data required to optimise production processes. "With the aid of the Bühler Insights platform, a client of ours – a global name in the milling industry – was able to achieve **48 percent less downtime, 49 percent fewer errors in the plant, 18 percent less energy consumption, and a 16 percent increase in overall equipment effectiveness**," says Cédric Menzi, Solution Architect for Bühler Insights.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

AI-BASED QUALITY ASSURANCE (PEPSICO & MICROSOFT) The American food and beverage corporation **PepsiCo** is piloting machine learning for quality assurance in manufacturing to **reduce waste and costs**. Automated monitoring and adjustment of product quality starts at the Cheetos extruder, where the developed AI solution, based on **Microsoft Project Bonsai**, monitors and automatically adjusts extruder properties. Project Bonsai is a low-code platform for the development of AI applications. Based on the concept of autonomous systems, these systems learn and act independently to solve complex tasks. Machine teaching can be used to train the behaviour of an autonomous control system. In the process, the AI system makes decisions and is encouraged to take actions that bring it closer to its final goal – the ideal Cheeto. Engineers at the production plant assess and reward the system’s actions, even without in-depth knowledge of artificial intelligence. “This is the future for process controls,” says Sean Eichenlaub, Senior Principal Engineer at PepsiCo. “We’re using AI-based automation to improve the consistency of our products.” At the same time, engineers can now leave routine checks and adjustments to the Project Bonsai solution, while investing their time in non-routine tasks.



Cheetos
Source: PepsiCo

REMOTE WORK IN MANUFACTURING (L'OREAL, MARS PETCARE & MICROSOFT) The cosmetics company **L'Oréal** employs people in 150 countries. To help employees be more efficient and productive, L'Oréal deployed **Microsoft Dynamics 365 Remote Assist on HoloLens 2** to make it easier to install, upgrade, troubleshoot, and audit manufacturing equipment with help from remote experts in real time. By connecting employees around the globe through mixed reality, L'Oréal is reducing costs, **optimising operations, and cutting down on travel** — a benefit that ties directly to the company’s long-term commitment to environmental sustainability and minimising its carbon footprint.

Mars Petcare manufactures pet food and treats, and operates 14 factories in North America. In recent years, the organisation has increased its focus on helping firstline workers gain the skills and tools to operate and maintain their equipment with minimal downtime in order to achieve greater efficiency and increased output. By investing in **RealWear HMT-1 hands-free headsets** equipped with **Microsoft Teams**, safe, hands-free collaboration is now possible. This makes factories more productive and reduces **travel and downtime** due to maintenance.



Mars Petcare employee with RealWear headset
Source: Mars Petcare

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

DIGITAL MANUFACTURING FOR ASSET OPTIMISATION (SIG & PTC) To date, digital manufacturing has only been introduced in certain areas, depending on how critical the manufacturing segment is. An example of this is the use of remote monitoring, predictive maintenance or real-time monitoring of assets and plant safety via industrial IoT, sensors, and AI.

SIG is an international, leading systems and solutions provider for aseptic carton packaging and equipment for beverages and liquid foods. The Swiss company produces more than 38 billion cartons a year, filling more than 10,000 products delivered to partners in 68 countries. Due to high cost pressure, SIG focuses on incremental improvements when it comes to optimisation and cost reduction in an already efficient system. The goal was to fully connect production, allowing all systems and machines to communicate and cooperate. By removing manual inputs and digitalising how they record data, SIG set out to leverage accurate, real-time data as the basis for KPIs to understand more effectively what was happening on the ground floor. With the **PTC ThingWorx** solution, SIG was able to connect machine PLCs (programmable logic controllers), their existing manufacturing execution sys-

tem, and other devices on the production floor to achieve real-time asset and utilisation monitoring. By connecting ThingWorx with production equipment, they were able to detect micro-outages for the first time. They also found that their machines were consuming more energy than was necessary. “We were pleased to see how quick and easy it was to connect power meters into the system. The added visibility of the energy consumption of our machines is one of many levers to **further reduce our carbon footprint**,” said Dr Scheermesser, Head of Production Process Improvement for Global Projects and Production Engineering at SIG.

REDUCING WASTE IN PRODUCTION (DIGIMARC)

The **Digimarc Barcodes** are digital watermarks that can be applied during production to make manufacturing inspections more effective. These digital barcodes contain essential data that is distributed multiple times over the entire surface of the packaging to facilitate automatic identification of certain packaging components during manufacturing inspections. This reliability **reduces waste caused by mislabelled packaging** and other errors that could be harmful to consumers.

Stores

Smart energy management in stores

ENERGY MONITORING AND OPTIMISATION (CARREFOUR EGYPT & SCHNEIDER ELECTRIC)

Carrefour Egypt and Majid Al Futtaim, its franchisee for the Middle East, Africa, and Asia, operate over 320 Carrefour stores in 16 countries. To optimise in-store energy consumption, a solution was needed that could provide insight on a store-by-store basis to benchmark performance and achieve savings across all locations. **Schneider Electric EcoStruxure Facility Advisor** enables building

managers to remotely manage and adjust sensor data from temperature, humidity and noise levels to energy consumption, equipment performance and space utilisation in real time. The solution offers performance reports and recommendations, timely alarm notification and a web portal for monitoring, analysis, and easy issue resolution. It also offers performance tracking across 19 stores to create benchmarks and deep analytics to locate energy sav-

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

ing opportunities. Carrefour Egypt was able to roll out the solution across 19 stores in only 16 weeks. It also **cut 7 percent on its electrical bills** and secured ROI within two years.

ENERGY-EFFICIENT LED LIGHTING WITH IN-DOOR NAVIGATION (EDEKA HH, MEDIAMARKT NL & PHILIPS/SIGNIFY) Signify (formerly known as Philips Lighting) is a leading global lighting corporation with expertise in innovation, and energy-efficient lighting products, systems and services. The **Signify Interact** solution offers lighting-based IoT applications such as lighting scene management, room management and indoor location services. The solution is made up of connected Signify LED lighting, the **Azure IoT** platform and a software development kit for apps.

EDEKA Clausen in Hamburg used the Signify LED lighting and Signify Interact solution to create zones throughout its store. These zones correspond with different departments, ensuring an interesting and unique experience for shoppers. Lighting can be scheduled to align with store opening hours and store managers can use an app on their smartphones to quickly and easily adjust the lighting in order to support new store layouts or promote specific events. And when combined with smart dimming schedules, the Interact solution and LED lighting can **lower energy costs by up to 35%**.

MediaMarkt Eindhoven in the Netherlands uses Signify LED lighting and the Signify Interact solution for in-store navigation to offer shoppers real-time location-based promotions. The patented visible light communication (VLC) technology embedded in each LED luminaire, sends a unique identification code to the MediaMarkt app on the shopper's smartphone via the smartphone's camera. The app can locate the smartphone to within 30 centimetres. This means shoppers can receive real-time, location-related information about products, offers or in-store navigation.

SMART MANAGEMENT OF BEVERAGE COOLERS (AB INBEV SOUTH AFRICA & CIRT) **AB InBev South Africa** manages a fleet of more than 100,000 beverage coolers in stores across remote and urban areas. Having service personnel physically visit retail locations to verify that a given cooler is in the right place, set at the right temperature, and being maintained appropriately is to be replaced by a more efficient auditing method.

This is where an IoT solution that uses sensors to collect data on the coolers and aggregate them called the **CIRT Fridgeloc Connected Cooler** came into play. It uses cooler-optimised sensors (Digital Twin Penguin), global connectivity (Thingstream global SIM card), cloud data processing and visualisation (**Azure IoT** and **Power BI**). It can be used by OEMs to outfit new devices or to retrofit old devices. The temperature within the cooler and the condenser, the cooler state (on or off), the number of doors and the cooler's location are monitored remotely using GSM triangulation.

The solution not only provides comprehensive insight into the location and performance of every IoT-enabled cooler, but it also found a correlation between temperature spikes and how the cooler is working:

- **Long temperature spikes:** indicate the cooler is being stocked. This provides the opportunity to better plan logistics by standardising supplies, optimising packaging of the delivery units, etc.
- **Short temperature spikes:** indicate a busy period at the retail outlet as the doors are being opened and closed, creating slight increases in temperature.
- **Temperature changes coupled with a cooler state:** indicate that the retail outlet has removed power to save energy. This stresses components like the compressor and could also reduce the quality of the product.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

These insights help better understand peak times, stocking schedules, and other operational patterns. The sales data make it possible to **more accurately calculate ROI for the coolers**. AB InBev can monitor coolers remotely and diagnose maintenance needs before a technician is dispatched. This **reduces the need for multiple trips and, therefore, carbon footprints**.

Other Microsoft partners in Europe and Germany that offer similar solutions include: **Robotron, Hitachi Solutions, Wipro, VisionIoT**.

AIR CONDITIONING AND REFRIGERATION MONITORING IN FOOD RETAILING (DANFOSS) The Danish company **Danfoss** produces heating and cooling technology as well as hydraulic and electric motors for retail and industry at 53 production facilities in 21 countries.

Alsense Food Retail is a cloud-based solution that uses **Azure Event Hubs** and sensors for super-

markets and food retailers to monitor the performance of their cooling systems and equipment, and react to alarms around the clock in order to reduce energy consumption, among other things.

Constantly monitoring a facility's performance can maximise operational times and reduce cooling costs due to less frequent service calls and refrigerant leaks. Real-time data from the stores offer insights to help customers manage refrigeration, HVAC and other IoT assets more efficiently.

Optimised temperature and alarm management improves the overall performance of the store and achieves better energy efficiency. According to Danfoss this resulted in:

- 40 percent reduction in food loss
- 80 percent decrease in time spent managing equipment issues
- 35 percent reduction in unplanned service costs
- 5 percent increase in sales performance
- 30 percent increase in total net energy savings

Inventory optimisation

A BETTER WAY TO REORDER FRESH PRODUCE (GLOBUS CR & BLUE YONDER) Ordering fresh produce can be difficult. Aspects such as minimum order quantities, varying delivery times and optimal inventory numbers must be taken into account to avoid waste caused by out-of-date goods. **Globus CR** uses **Blue Yonder's Luminare Store Fulfilment** to automatically reorder products using AI technology. This reduces the risk of lost revenue if order quantities are too low or the destruction of goods if quantities are too high. Overall, fewer goods are ordered without consumers noticing a thing. "Promotions represent almost half of Globus' Food business in Czech Republic: in the assortments using AI-driven automated ordering from Blue Yonder, the result is **20% less out-of-stock** while **reducing leftover stock after the promotion by 40%**," says Hans-Jörg Bauer, CEO of Globus CR, v.o.s.

PRICE REDUCTIONS FOR GOODS NEARING EXPIRY (MORRISONS & BLUE YONDER) A number of factors need to be considered to find the optimal markdown: price elasticity, the effect of price reductions on purchase probability, the best-before date and the amount of stock in inventory. British supermarket chain **Morrison's** uses the **Blue Yonder Luminare Pricing Real Time** solution to optimise markdowns and reduce **waste caused by expired food by 10 to 20 percent**.

INTELLIGENT INVENTORY MONITORING FOR INVENTORY DEVICES (STARBUCKS & MICROSOFT)

Starbucks serves around 100 million customers every week in its 30,000 stores in nearly 80 countries. Each Starbucks store has more than a dozen pieces of equipment, from coffee machines to grinders and

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

blenders, that must be operational around 16 hours a day. A glitch in any of those devices can mean downtimes, service calls and repair costs. And worst of all – it could mean poor customer experiences.

To reduce disruptions, Starbucks uses **Azure Sphere**, which is designed to connect store devices with the internet of things (IoT) and protect data, physical devices and company infrastructure. The solution is made up of Azure Sphere-certified hardware chips, the fitting operating system and the corresponding security service that guarantees secure communication between devices and the cloud as well as continuous device security. An external device called a **guardian module** connects various pieces of equipment to Azure Sphere.

The IoT-enabled machines collect more than a dozen data points for every shot of espresso pulled, from the type of beans used to the coffee's temperature and water quality, generating more than 5 megabytes of data in an eight-hour shift. Starbucks is thus able to proactively maintain the machines and manage inventory. In addition, this makes it possible to order raw materials and consumables as needed, which in turn leads to waste reduction. The solution will also enable Starbucks to send new coffee recipes directly to machines, which it has previously done by manually delivering the recipes to

stores via thumb drive multiple times a year. Now the recipes can be delivered securely from the cloud to Azure Sphere-enabled devices at the click of a button. "Think about the complexity — we have to get to 30,000 stores in nearly 80 markets to update those recipes," says Jeff Wile, Senior Vice President of Retail and Core Technology Services for Starbucks Technology. "That recipe push is a huge part of the **cost savings** and the justification for doing this." Equipment manufacturers are encouraged to integrate the solution into future machine versions to make retrofitting obsolete.

AUTOMATED ORDERING WITH INTELLIGENT PUSHFEED SYSTEMS (STRENGE, POS TUNING & NEOALTO)

One of the best ways to know if a technology solution is good is to see if the developer uses it. Since 1998, **POS TUNING** has been developing internationally successful systems for optimal product presentation in retail – from pushfeeds, and lift and glide systems to lighting, organisation and theft prevention systems. To ensure smooth running in production and management, POS TUNING requires what is known as C-parts, which are low-value, high-importance goods such as cleaning agents or products for repairs, maintenance and servicing. The procurement costs of C-parts are particularly



Starbucks baristas are able to spend more time hand-crafting the perfect beverage and less time on machine maintenance thanks to cloud-connected devices.

Source: Starbucks

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

high compared to their actual value. Different people within a company often – and without prior consultation – buy C-parts from various suppliers, leading to unrealistically high procurement costs and efforts. Automated order processing systems can save time, money and deliveries.

That is why POS TUNING joined forces with its supplier **Streng** and its technology partner **nealto** to launch an automated C-parts management system. It is based on **POS TUNING’s smart push-feed solution** and **nealto’s automatic ordering solution** on the **Azure** platform. First, they automated the process for procuring maintenance materials and cleaning agents. This meant replacing the previous manual ordering process in SAP and reducing the large number of suppliers. Streng came in to review the product range and took over as supplier for as many of the items as possible.

The smart pushfeed solution and order automation were used on the warehouse shelves to eliminate the need to manually place orders. The push-feed system uses laser sensors to automatically determine how much stock is on the shelf and ensures easy access. The IoT-based solution measures inventory and the movement of goods in real time and sends this information to the nealto solution. The data are then used to place automated orders.

Individual framework parameters regulate inventory according to need, turnover and storage capacity for each item. As soon as an item reaches its purchase order quantity it is automatically placed in the electronic shopping basket and is included in the next order. This eliminates manual efforts for stock determination, order entry and ordering.

According to POS TUNING, the company has benefitted from the following since switching to automated C-part management:

- Automated inventory monitoring: no manual ordering necessary
- Perfect availability of goods: 75 percent fewer out-of-stocks
- Optimised procurement and storage: **50 percent fewer orders and less packaging waste**
- Minimal ordering costs: reduction of process costs by 27 percent
- Time saved for skilled work: 11 hrs/month more time for skilled work

For Streng, as a supplier, the solution means monthly savings of EUR 175 in transport costs and EUR 163 for order processing and a yearly **carbon reduction of 105 kg**.



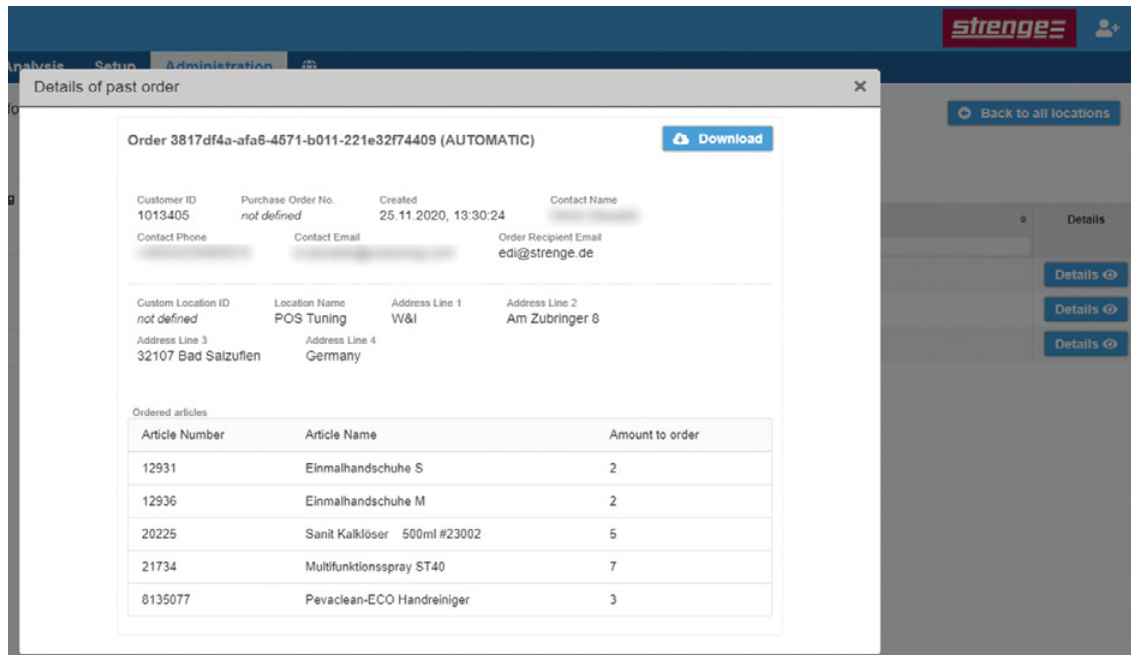
Source: POS TUNING/nealto



Source: POS TUNING/nealto

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion



POS TUNING shelf, presentation in the neoalto solution and order display in Strenge ERP

Source: POS TUNING/neoalto

Waste reduction

ELECTRONIC SHELF LABELS (COLRUYT & SES-IMAGOTAG) Electronic shelf labels (ESL) such as those offered by **SES-imagotag** are being used more and more in all retail segments. One reason for this is that they are available in many different formats such as shelf labels, displays or hang-tags. The growing number of sales promotions in retail means solutions need to be found that allow prices to be changed efficiently in store. Dynamic pricing based on AI technology also makes electronic shelf labels essential. Prices are recorded centrally via an IoT platform such as SES-imagotag VUSION, which also enables corrections to be made quickly. The central platform can display all data holistically and allows for automatic notes on best-before dates or recommendations for stock adjustment to be generated.

In addition, the LED light on the ESL makes pick-by-light possible in the store or warehouse. The NFC function allows store staff and customers to

access item information, provided that this function is used, for example, in a customer app.

ESLs are a sustainable option as they save paper, ink and energy that are required for paper-based shelf labels. For example, according to **Colruyt**, the use of ESLs in its 290 stores in Belgium and Luxembourg **has replaced 75 million paper labels** and thus around **90 tonnes of paper per year**. SES-Imagotag estimates that using ESLs in 2020 will **save more than 100,000 trees**. SES-imagotag is also recycling discarded ESLs and in 2020 **30 percent more ESLs were recycled** than in 2019.

Recycled ESLs are used in ESL innovations such as the **Captana** shelf camera in ESL format. The camera monitors inventory on the shelf opposite (it is GDPR compliant and does not record people). Item information does not need to be entered via a static planogram but is automatically detected via the ESLs on the opposite shelf.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

SMART SHELF FOR STORAGE AND WASTE REDUCTION (REWE AUSTRIA & BIZERBA) Fresh items, such as baked goods, that are prepared in store as required are often at risk of overproduction or underproduction. To **avoid waste and out-of-stock situations** predictive demand planning and inventory management are essential.

Rewe Group in Austria equipped the bakery shops in three of its stores (Merkur or Billa Plus) with the **Bizerba Smart Shelf**. The weight sensors built into the shelf recognise when a product is taken, and document its shelf position in the Bizerba solution that is based on the **Azure IoT Hub** and **Azure AI**. If it registers, for example, that pretzels are running out, it automatically activates the oven at the right setting – adjusting accordingly for precisely the amount needed. Automated monitoring means that customers will always find fresh pas-

tries and employees do not have to spend their time doing manual stocktaking. AI is used to evaluate the data collected and create sales forecasts so that baking is optimised over the course of the day. Prices on the shelf are dynamically adjusted via the solution and automatically updated on the ESLs in order to ensure that remaining stocks are sold before closing time, meaning less waste.

The **Bizerba Organic Store** self-service solution allows customers to freely fill unpacked products into reusable containers. The intuitive user interface allows customers to tare, fill, weigh and label their selection of loose or liquid products within seconds.

This results in needs-based shopping and the reduction of food waste. Waste is also reduced due to **the removal of unnecessary packaging**.



Bizerba Organic Store filling station
Source: Bizerba



Bizerba Smart Shelf
Source: Bizerba

SHRINK REDUCTION USING INTELLIGENT PACKAGING (NETTO MARKEN-DISCOUNT & DIGIMARC) The **Digimarc Barcode** is a barcode that is invisible to the human eye. It is integrated into the packaging design and applied across the entire surface. The barcode can be scanned on all sides, improving scan accuracy at any checkout – tradi-

tional, self-checkout, scan & go, etc. – and shortening waiting times and contact times. **Netto Marken-Discount** (Reta Award/Top Supplier Retail 2020 Award) has already added the Digimarc Barcode to more than 2,000 products and plans to eventually cover all products in its own brand range.



Winner 2020

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

The **Digimarc Barcode for thermal labels** is also available for fresh and convenience products. Because it contains the EAN over its entire surface, the Digimarc Barcode offers better readability than traditional barcodes, regardless of damage or label adhesion. This reduces operational shrinkage at the register and **avoids unnecessary waste**.

In-store scanners or mobile devices can be fitted with a software development kit and software extensions can be used to create the digital barcodes.

SEAMLESS SHOPPING WITH ENVIRONMENTALLY-FRIENDLY RFID LABELS (NESTE OY) & STORA ENSO) Finnish corporation Neste has transformed from a petroleum company to a leading global provider of renewable fuels. Neste operates around 1,000 service stations with convenience stores in Scandinavia. This is why Neste invested in innovative store formats and checkout technologies.

Neste uses **Stora Enso's sustainable ECO RFID Tag Technology** for its recently launched unmanned Neste Easy Deli stores. The ECO RFID tags enable automated and unmanned, 24/7 service in the Neste

Easy Deli store. The ECO RFID tags are made by printing RFID labels to renewable paper, without plastic layers and harmful chemicals. This results in a significant reduction in life-cycle carbon emissions. The collaboration enables Neste to **lower its carbon emissions related to RFID tags by up to 40%**.

Based on the ECO RFID tags, Stora Enso offers a ready-to-use solution for automated and unmanned retail: **New Retail Solution by Stora Enso**. At the core of the system are RFID-enabled e-kiosks or Intelligent Cabinets, designed for purchasing or collection using smart phones. The cabinets are unlocked from a smart phone via any compatible payment app such as WeChat or MobilePay. Each item has a tamper-proof, sustainable Stora Enso ECO RFID tag, which is automatically detected by the cabinet. When the cabinet door is closed, the consumer is charged via the app for the items taken out. A back-end solution also allows users to see transactions, keep track of stock and make orders. The **Azure** platform forms the basis of the cloud-based data collection and analytics services.



Neste Easy Deli store
Source: Neste



Stora Enso New Retail Solution at the EuroShop 2020
(©Messe Düsseldorf)
Source: Messe Düsseldorf

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

DIGITAL RECEIPTS (ANYBILL) The [German law on receipts](#) made receipts mandatory in Germany from 1 January 2020. The receipt can be issued electronically or in paper form. It must, however, be issued at the same time as the business transaction. The [anybill solution](#) for digital receipts allows German retailers to use the digital receipt for smart interactions with customers and reduce their receipt costs by up to **33 percent, according to anybill**. The solution offers three ways to receive the digital receipts:

- **By scanning the QR code/barcode:** At the register the QR code or barcode can be scanned in the app and the receipt sent directly to the smartphone.
- **By scanning a QR code on the customer display:** The QR code displayed on a customer or terminal display can be scanned and the receipt received digitally – with or without the app.
- **By linking a payment method:** Digital receipts can be received with existing banking cards. Payment methods can be connected and digital receipts activated in the banking app.

Digital receipts also aid in digital customer retention. Customers can collect loyalty points when they receive their digital receipt without needing to scan a customer card (One Touch Loyalty). Retailers can create their own bonus cards and display them to customers in the app (rewards). Customer retention can also be improved using individual level systems or by supporting social projects (gamification and social coins).

In addition to the anybill app, a dedicated SDK, Rest API and whitelabel solution are available for implementation in the merchant or banking app. anybill guarantees that data are protected and security and data protection standards are GDPR compliant. Personal data are not transferred to third parties. Data are encrypted and saved in a data centre belonging to Telekom in Germany, assuring that international security standards, such as ISO 27018 or ISO 27010 are adhered to. anybill works together with Microsoft to use modern technology and a scalable technical infrastructure.



anybill app when scanning the QR code at the customer terminal
Source: anybill

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

LAST-MILE EFFICIENCY (BERGENDAHL'S & STRONGPOINT) Increasing demand for hybrid shopping models such as click & collect or curbside pickup require retailers to not only implement new processes but to adopt new digital solutions to support these processes.

Swedish grocery store **Bergendahl's** has rolled out **StrongPoint's Pick & Collect** solution across all 40 City Gross stores in Sweden. The solution supports a quick and easy picking process in store, which provides the customer with greater flexibility regarding pick-up times, giving each store the op-

tion to offer a wide assortment of local produce and **greatly reducing unnecessary food transport.**

The online delivery orders are completed by Bergendahl's staff at local City Gross stores using Pick & Collect mobile devices, maximising efficiency and reducing fulfilment time. Previously, online orders were processed in central warehouses and delivered to consumers over long distances. The new fulfilment process replaces long truck journeys, significantly lowers the impact on the environment and also means customers can enjoy fresh, locally-sourced produce faster than ever.



Source: Bergendahl's

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

Customers & Circular Economy

Customer commitment to sustainable consumption

SMART RECYCLING BINS (H&M, OMBORI) Since 2013, **H&M** has been collecting used garments – of any quality or brand – in their stores as part of their company commitment to sustainability. The donated items are then recycled or reused. In addition, for every 22.6kg (50lb) of clothing collected through the program, H&M plants a tree via its partner **One Tree Planted**. To make its Garment Collecting Program a little more exciting for customers, H&M wanted to create an innovative in-store installation that would raise awareness of the program, show what the program has achieved, and make customers feel good about contributing.

H&M turned to the expertise of Microsoft partner **Ombori**, with which it had worked previously

on the **H&M Voice Interactive Mirror** based on its **Ombori Grid** solution on **Azure**.

Ombori, in association with Microsoft and ITAB, developed a **smart recycling bin** that incorporates an interactive screen and an integrated scale. In order to ensure maximum visibility the automated bin was placed near the checkouts in H&M's flagship store on 5th Avenue in Manhattan. When the customer makes a donation, the smart bin automatically weighs the clothing. The screen then thanks them for their donation and tells them how much they have contributed.



Source: H&M, Ombori

Navigation

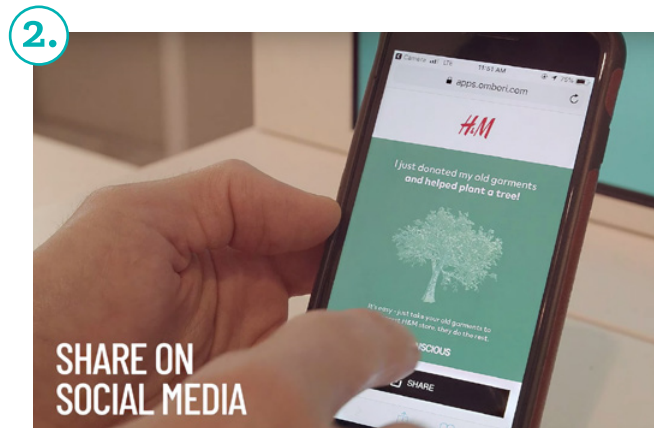
[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)



Source: H&M, Ombori

1. It displays the total amount of clothing collected via the bins both at their local store and at other stores nationwide. This helps donors feel that their donation is appreciated and shows them that what they are doing is making a real difference.

2. Donors can share their experience on social media to encourage their friends to participate in the program.



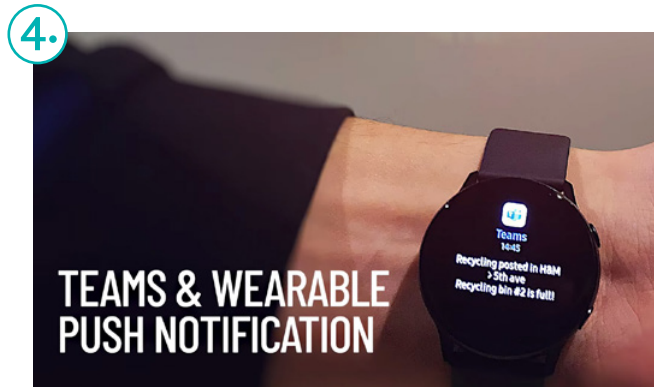
Source: H&M, Ombori



Source: H&M, Ombori

3. Finally, donors can scan a QR code to access online information about H&M's sustainability initiatives and what they are doing to reduce their environmental impact.

4. The bins are integrated with Microsoft Teams. This allows them to notify staff via mobile and smartwatch when they need to be emptied.



Source: H&M

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

KEY RESULTS AND FIGURES

- The smart bin was launched in January 2020 in the H&M store in Manhattan’s 5th Avenue.
- After the success of the New York pilot installation, the smart bins will be rolled out across the USA in 2020. They will be installed in H&M stores in Washington DC, Los Angeles, San Francisco, Miami, Chicago, Atlanta and Houston.
- In 2020, H&M aimed to collect **five million pounds (2.3m kg) of recycled clothing through the smart bins in the USA**. This would enable the company to **plant 100,000 trees** in association with the One Tree Planted organisation.

VIRTUAL FITTING ROOMS (REACTIVE REALITY)

Return rates are particularly high in online fashion retailing. This is where the augmented reality solution from **Reactive Reality** comes into play: The patented algorithms automatically convert images of products and people in photo-realistic 3D models. The technology allows online shoppers to visualise products before buying them, create body measurements and virtually try on clothing.

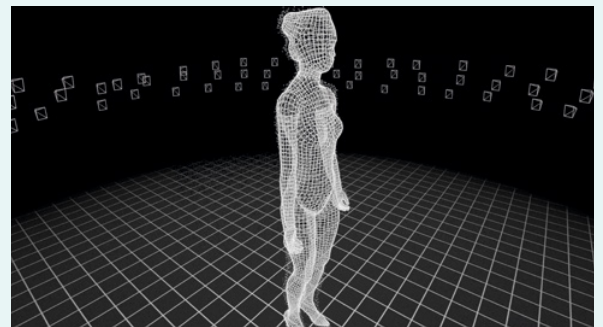
How it works:

1. Avatar capturing & generation: Online shoppers create their own customised 2D & 3D avatars on mobile devices within minutes.
2. Garment capturing & generation: Retailers use their existing photo studios to transform photos into accurate 2D & 3D assets in a fast and scalable way – taking account of size charts.
3. Virtual try-on: Online shoppers experience detailed product viewing, receive size recommendations, mix and match outfits on their avatar and immerse themselves in real or virtual background scenes.

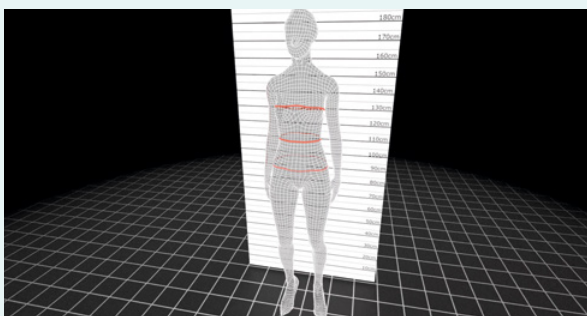
When online shoppers can try on different outfits and sizes virtually, they make the right decisions first time. According to Reactive Reality, this leads to a **significant reduction in return rates of up to 70 percent**. Demos and further details: [here](#)



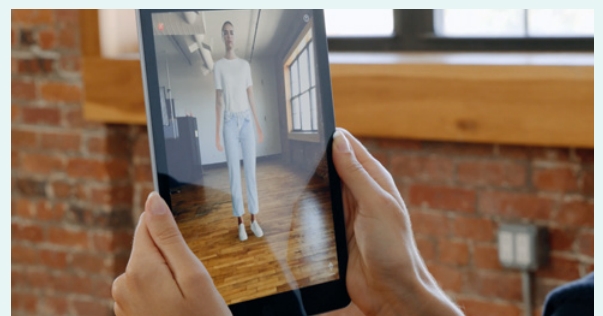
Source: Reactive Reality



Source: Reactive Reality



Reactive Reality avatar generation and virtual try-on
Source: Reactive Reality



Source: Reactive Reality

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

SUSTAINABLE SMART CITY PLATFORM (BUNDLE REGIONAL) Particularly for small and medium-sized retailers in city centre locations, it is hard to know which digital innovations can yield the highest reward without disproportionate effort.

The **bundle platform** allows all relevant regional stakeholders to get involved: municipalities, municipal companies (for example, energy service providers or transport companies), retailers and locals. The bundle platform makes it possible to quickly and easily connect and orchestrate services across all sectors in the city. The platform also offers value-added services that can be used modularly.

App with ID:

- Authorised ID for all digital services in the city
- Universal mobile payment system for all services using the digital City Card
- Reward system including gamification relating to the 17 sustainable development goals

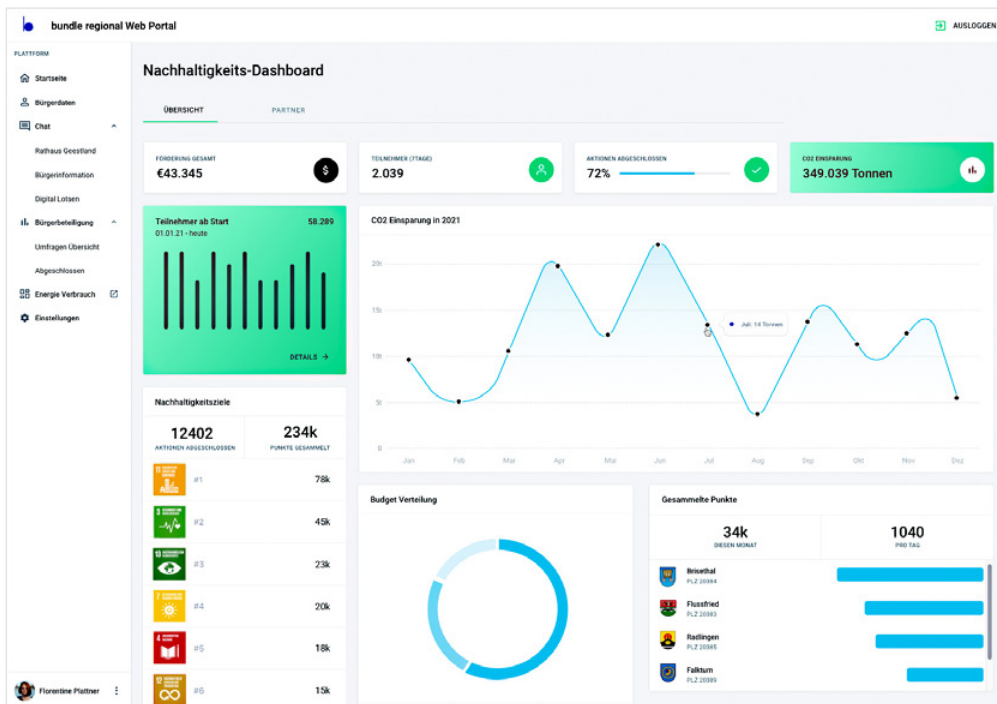
Stakeholder Dashboard:

- Setting up and managing initiatives, actions, and offers for locals
- Example: Renting an e-bike sponsored by a transport company results in a cashback bonus for people who use their City Card. This can then be redeemed at all local participating retailers.
- Relating the initiative to the 17 SDGs at a regional level and using stakeholders to track goal attainment

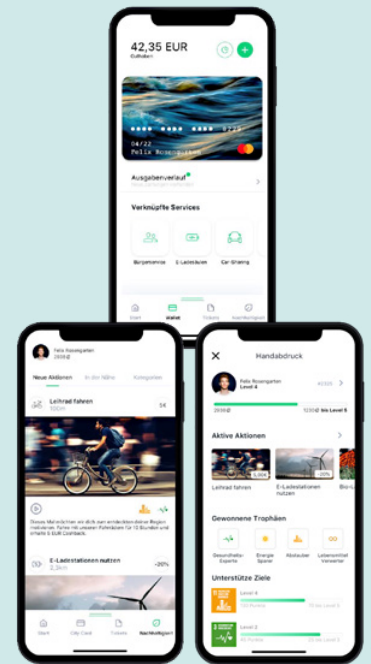
Web-based CRM:

- Providing data-driven services necessary for the app and Stakeholder Dashboard
- Evaluating consumer behaviour
- Communication channels with groups and individuals

This solution is currently only available in German.



Bundle Dashboard
Source: Bundle NAS



Bundle App
Source: Bundle NAS

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

Transparency & traceability

See solutions on [page 26](#).

Circular economy & recycling

RECYCLING PACKAGING (HENKEL, HOLY GRAIL PROJECT & DIGIMARC) The **Digimarc Barcode** on plastic packaging makes it easier to sort at waste facilities. It is important that waste is reliably sorted into different types of plastic for packaging to be recycled. The high rate of accuracy improves the quality of recyclates and increases their reusability.

More than 80 well-known manufacturers and retailers are taking part in the **Holy Grail 2.0 project** facilitated by the European Brands Association (AIM). One of these manufacturers is **Henkel** which aims to use digital watermarks based on the Digimarc Barcode to sort and recycle waste. The goal is to achieve **higher quality recyclates and recycled packaging** in the EU and, ultimately, a true circular economy.

Retailers and brands with a mobile app for consumers can use the **Digimarc Mobile SDK** to scan Digimarc-activated packaging. Shoppers and employees can scan packaging to better understand the recycling options for that item, including where to recycle and redemption values.

NETWORKED PRODUCTS IN FASHION (GABRIELA HEARST, EON & MICROSOFT) The American designer brand **Gabriela Hearst**, named after the Uruguayan designer, places particular focus on sustainability. The brand's Spring/Summer 2020 fash-

ion show, for example, was one of the first to be carbon neutral. In addition, the fashion brand has also entered into a pioneering partnership with the software platform **Eon**, which assigns digital identities to articles from the Gabriela Hearst collection.

Eon is a tech startup from New York City that runs an IoT platform to give every garment a digital identity, or a “digital twin”, and thus document where it is in the lifecycle. By connecting products, brands are able to use data and insights into new consumer demands to create lasting relationships with their customers. It also gives them the systems they need to adopt new business models and offers, such as rental, resale, digital wardrobe apps, peer-to-peer exchanges, styling services, reuse, and recycling.

Eon's CircularID Protocol™ and **Eon's Connected Products Platform** use the **Azure** Cloud to aggregate IoT data, analyse it using AI and ensure global scalability. **Microsoft is also a partner of the CircularID Initiative (Video)**, which supports circular business models in the textile industry. Other partners include H&M, Target, PVH Corp, waste management companies and other companies from the worlds of research, design and sustainable fashion.

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

When Eon creates a Connected Product each garment receives a “digital passport”. This embeds data into the garment and records information about how it moves through the world:

1. Printed or embedded tags within each garment – such as a QR Code, RFID, NFC, or Bluetooth LE – enable data to be associated with the item and captured across its lifecycle.



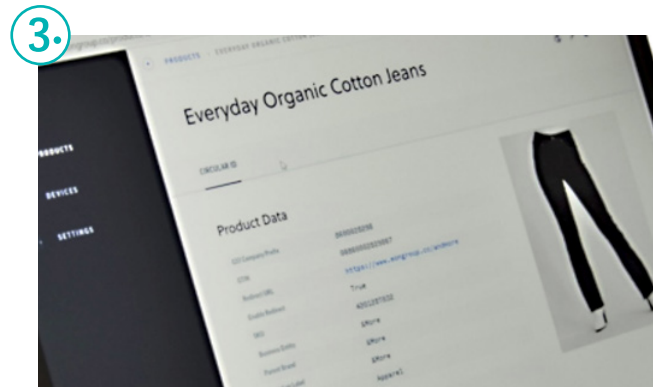
Source: Eon

2. An RFID tag can be read by an RFID scanner and the data placed on Eon’s platform so different stakeholders – from consumers to recyclers – can interact with them.



Source: Eon

3. These data come together as a product dashboard on Eon’s platform, hosted on **Azure Cloud**.



Source: Eon

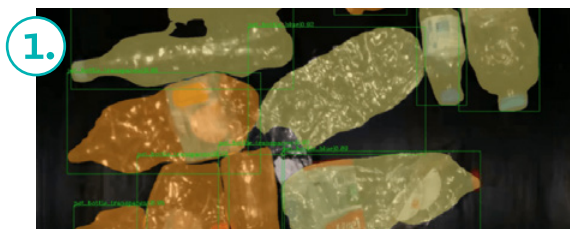
According to Eon, without a digital identification system, products are essentially “lost” once they’re sold. It’s nearly impossible to track and reclaim those garments, which ultimately leads to both environmental and economic waste. To digitise prod-

ucts on a large scale, Eon is partnering with Microsoft, brands, retailers, and stakeholders across the fashion industry with the goal of building a **Connected Products Economy**, which aims to solve the “take, make, waste” model in fashion.

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

AUTOMATED IDENTIFICATION OF WASTE DURING SORTING (RECYCLEYE) With 2 trillion tonnes of waste being produced each year – only 8% of which is recycled – a viable solution is needed to increase rates of recycling globally and accelerate the world’s transition towards a circular economy. **Recycleye** has developed a computer vision system that replicates the power of human vision to identify every item in waste streams, using AI to automate waste sorting and improve recycling. The company’s strategic partners include **Microsoft**, Imperial College London, the Alliance to End Plastic Waste, and many others.



Source: Recycleye

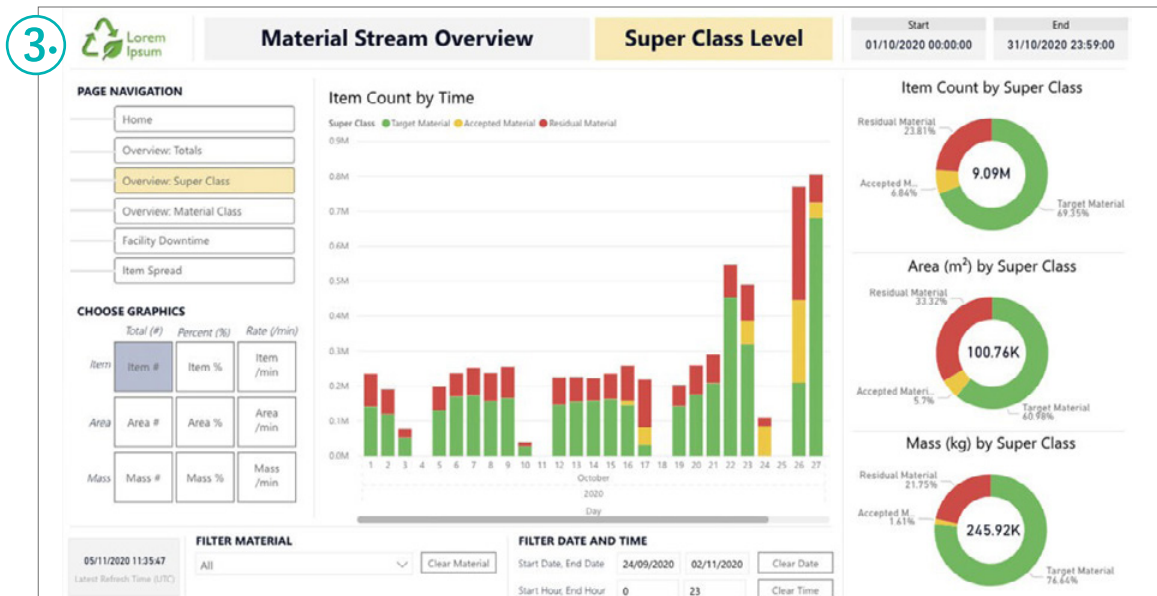


Source: Recycleye

The Recycleye solution uses deep learning and AI on the **Azure** Cloud with a low-cost, rapidly deployable, decentralised, scalable, and fully automated sorting solution which can be deployed inside waste management facilities:

1. **Artificial intelligence:** The AI in Recycleye can recognise items, broken down by material, object and even brand. The AI is trained using WasteNet, the world’s largest visual data set of labelled waste items.
2. **Hardware:** Reliable hardware with remote support and 24/7 live monitoring, and plug and play installation.
3. **Software:** The Recycleye Smart Analytics platform offers full visibility of facility performance, trend analysis, and total wastestream knowledge so that material recovery throughput can be optimised.

Recycleye’s goal is to create **waste removal chains** that are just as efficient as today’s supply chains, bringing transparency, accountability, and traceability to the waste management industry.



Source: Recycleye

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

Conclusion and Outlook

For some retail companies, the road to sustainable smart stores is still long. Nevertheless, as this White Paper has shown, many new and exciting solutions are being developed that use innovative technologies, such as AI and IoT, to improve sustainability.

What this means is that digital solutions can be used today to promote sustainability initiatives in retail. Cloud technologies, for example, are helping users reduce their carbon footprints, while digital solutions are providing endless possibilities for companies to reach their sustainability goals in key

areas of action ([see page 24 and onwards: Digital Sustainability Solutions for the Retail Industry](#)).

It is safe to assume that with the help of targeted policies, the importance of technology-based energy management in retail will continue to grow over the coming years. At the same time, thanks to rapid developments in technology, especially in the field of artificial intelligence, we may soon find that sustainable smart stores are no longer tomorrow's vision, but today's reality.

Appendix

Customer stories – overview

Headquarters:

- IKEA
- Unilever DACH
- LVMH
- Microsoft

Supply Chains & Logistics:

- Intermarché
- Microsoft
- DHL

Product Range & Production:

- Land O'Lakes
- Orsay
- Archer Daniels Midland
- Bühler
- PepsiCo
- L'Oreal
- Mars Petcare
- SIG

Stores:

- Carrefour Egypt
- Edeka Hamburg
- MediaMarkt NL
- AB InBev South Africa
- Globus CR
- Morrisons
- Starbucks
- Strenge/POS TUNING
- Colruyt
- Rewe Austria
- Netto Marken-Discount
- Neste Oyj
- Bergendahls

Customers & Circular Economy:

- H&M
- Henkel & Project Holy Grail
- Gabriela Hearst

Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

Microsoft partner solutions – overview

Headquarters:

- Systrion
- EcoVadis
- Iconics
- Ecolab
- Trucost
- ABB

Supply Chains & Logistics:

- SGS Transparency One
- Blue Yonder
- Digimarc
- Bosch
- Arvato
- CH Robinson
- Far Eye
- T-Systems International
- Deutsche Telekom IoT

Product Range & Production:

- Blue Yonder
- Ecolab
- PTC
- Digimarc

Stores:

- Schneider Electric
- Philips/Signify
- CIRT
- Danfoss
- Blue Yonder
- neoalto
- SES-imagotag
- Bizerba
- Digimarc
- Stora Enso
- anybill
- StrongPoint

Customers & Circular Economy:

- Ombori
- Reactive Reality
- bundle regional
- Digimarc
- EON
- Recycleye

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

List of figures and tables

Figure 1	Breakdown of electricity consumption by categories – food retail	15
Figure 2	Breakdown of electricity consumption by categories – non-food retail	15
Figure 3	Measures to save heat energy – food retail	16
Figure 4	Technology trends and projects – the most important technological developments in the next three years	17
Figure 5	Assessment of new technologies – smart energy management	18
Figure 6	Assessment of new technologies – Internet of Things	19
Figure 7	Assessment of new technologies – parking spaces with electric vehicle charging stations	20
Figure 8	Cloud – importance of cloud-based applications in companies	21
Figure 9	Reasons for cloud use – what are the most important drivers for the use of cloud-based applications?	22
Figure 10	Electronic shelf labelling – the use of electronic labels in food retail	23
Table 1	Typical areas of focus and action	8

Navigation

Contents | 1. Introduction | 2. Sustainability | 3. Smart Stores | 4. Sustainable Smart Stores | 5. Results of the EHI Study | 6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy | 7. Conclusion

ABOUT EHI

The EHI Retail Institute is a research and consultancy institute for the retail industry and its partners, with around 80 employees. The international EHI network comprises some 800 member companies from the retail, consumer goods and capital goods industries, along with service providers. EHI gathers key performance indicators for brick-and-mortar and online retail, identifies trends and works out solutions. The company was founded in 1951. Its President is Kurt Jox, the Managing Director is Michael Gerling. GS1 Germany is a subsidiary of EHI and the German Brand Association and coordinates the allocation of Global Trading Item Numbers (GTIN, formerly EAN) in Germany. In cooperation with EHI, Messe Düsseldorf hosts EuroShop, the world's leading capital goods trade fair for the retail industry, EuroCIS, where the latest products, solutions and trends in IT and security technology are presented, and C-star in Shanghai for the Asian retail industry.

Further information about EHI is available online: www.ehi.org

ABOUT MICROSOFT

Microsoft is the world's leading manufacturer of standard software, services and solutions designed to help people and companies to realise their full potential. Retailers and brand manufacturers use digital transformation to remain ahead of the competition. The Microsoft solutions enable retailers to combine their knowledge of the digital world with their knowledge of over-the-counter retail to deliver personalised customer experiences and ensure motivated employees and efficient processes.

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Navigation

[Contents](#) | [1. Introduction](#) | [2. Sustainability](#) | [3. Smart Stores](#) | [4. Sustainable Smart Stores](#) | [5. Results of the EHI Study](#) | [6. Sustainability Solutions – Headquarters – Supply Chain & Logistics – Product Range & Production – Stores – Customers & Circular Economy](#) | [7. Conclusion](#)

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