

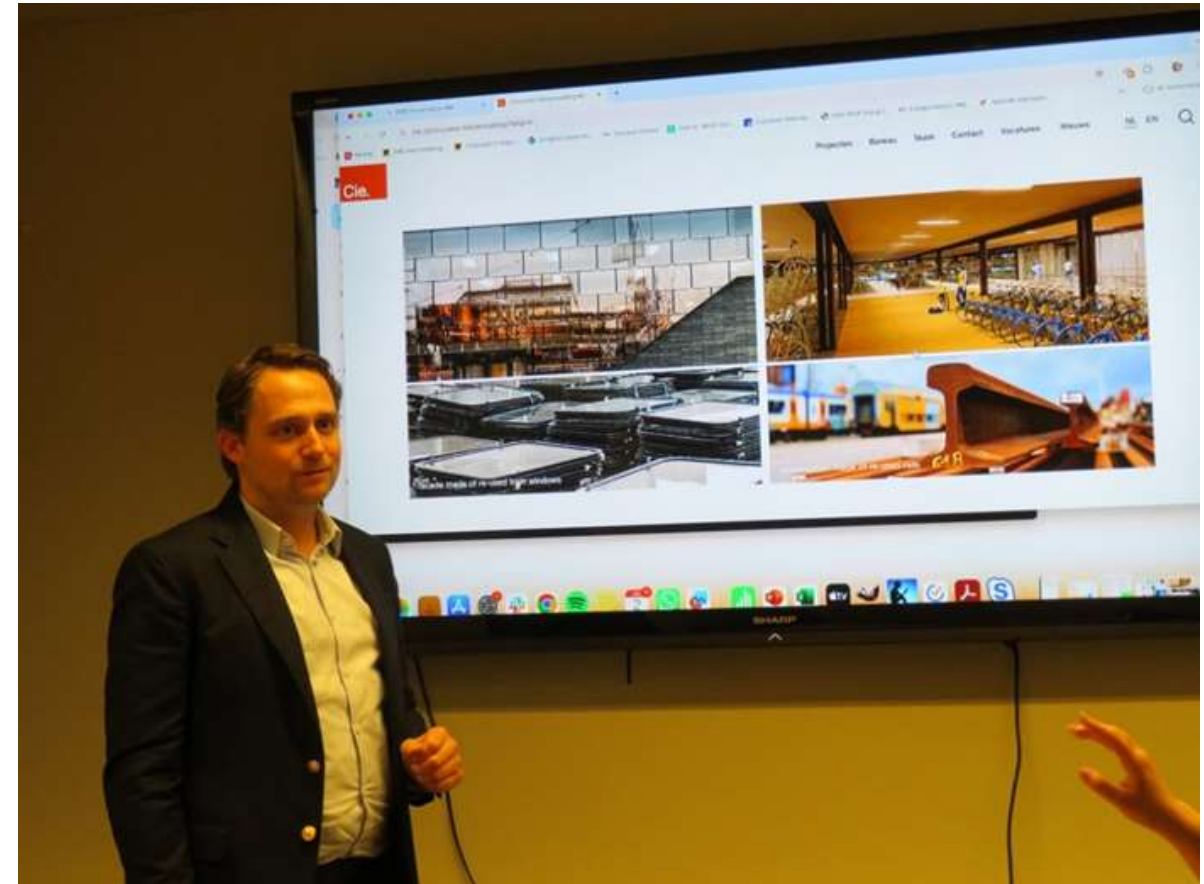
Survey Report 1

Excess Materials Exchange (EME) (Case Study of Waste Information Utilization)

Excess Materials Exchange (EME)

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Visiting location: Amsterdam, The Netherlands



Company Profile

- **EME is a pioneering digital platform designed to accelerate the transition to a circular economy by facilitating the efficient reuse of materials and products. EME tackles the crucial issue of resource inefficiency in the global economy, providing a solution that benefits the environment and generates economic value for businesses. Through its innovative technology, EME connects companies, enabling them to identify, exchange, and repurpose excess materials transforming potential waste into valuable resources.**

Company Profile

- **EME was established in 2017. At the beginning of the start-up, there was no data on resources at all. In addition, in the construction industry, which generates large amounts of waste in many countries, half of the waste was not being used effectively. EME wanted to make a significant impact in such an industry. EME also wanted to leave an impact on waste from plastics, textiles and foodstuffs in terms of type.**

EME's services and tools

1

Resources passport: comprehensive material identity

The resources passport goes beyond simple identification; it encapsulates a material's entire story. This digital passport includes detailed information on composition, origin, recyclability, and environmental impact, making it an essential tool for stakeholders to assess the value and sustainability of materials. It's a cornerstone of transparency in the circular economy, ensuring materials are fully utilized and efficiently recycled.

2

Tracking and tracing: ensuring accountability and transparency

EME's tracking and tracing system integrates cutting-edge technology to monitor the journey of materials throughout their lifecycle. Utilizing barcodes, QR codes, and RFID technology, it connects the physical material to its digital passport, allowing for real-time tracking and ensuring that materials are used responsibly and optimally throughout their lifecycle. This system is pivotal for closing the loop in the circular economy, providing the data needed to make informed decisions about material reuse and recycling.

3

Valuation: quantifying material value

Valuation at EME isn't just about financial metrics; it encompasses environmental and societal impacts, offering a holistic view of a material's true value. This approach enables companies to make data-driven decisions, choosing pathways that not only maximize economic returns but also benefit the planet. It's a revolutionary way of thinking about value, transforming the way industries perceive and utilize materials.

4

Matchmaking: AI-driven solutions for material reuse

EME's matchmaking service leverages artificial intelligence and machine learning to identify the best reuse and recycling opportunities for materials. This isn't just about finding a match; it's about finding the right match that maximizes value, minimizes environmental impact, and fosters innovation across sectors. By combining technology with expert insight, EME ensures that materials find their highest-value uses, promoting efficiency and sustainability.

(1) Resource Passport

- **Applying QR code and blockchain technology, products are recorded with raw materials, processing information, duration and place of use. A digital record that allows stakeholders to check and update this accurate information is called a resource passport.**
- **Resource Passport has users in a wide range of industries and sizes, including government agencies, local governments, large corporations, and small and medium-sized enterprises, but it is often used in the construction industry.**

(1) Resource Passport

- **It is necessary to register and track information of materials at the beginning of the value chain, but in the case of use by government agencies, it may be difficult to register information due to their regulations. Some resource passports are standard across European countries, industries, and vendors, so it can be difficult to register for EME resource passport.**
- **It is not used for the purpose of government monitoring, but depending on the organization or industry, it is necessary to report to the government the use of recycled products, and it may be reported from the information in the resource passport.**

(1) Resource Passport

- **The fields of information to be registered are as flexible as possible. As the required information settings vary depending on the user and material, the field settings are flexible to enable effective matching.**
- **In the unlikely event that the information entered is incorrect, this could lead to trust issues. It is necessary to ensure that users enter their information with a high awareness of registering accurate information. The challenge is to ensure that users are able to enter accurate information.**

(1) Resource Passport

- **A good example of accurate information entry: carpets held by a recycler were insured because the information was registered accurately, even though polypropylene was the standard for less than 2% of use.**

(2) Tracking & Tracing

- **The information in the resource passport can be obtained by scanning QR codes and barcodes to obtain accurate information on waste. These are registered with waste movement information to keep track of the waste lifecycle.**
- **The QR code is used twice: once to scan the code and upload waste information, and again to scan the code and upload information on tracking, such as where the waste has been moved to.**

(2) Tracking & Tracing

- **High-level control of waste tracking requires minimizing risks such as data tampering. The EME system means that the history cannot be changed in the blockchain. The system also complies with the European GDPR (General Data Protection Regulation) and protects information on the material itself and the individuals registered.**

(3) Evaluation

- **When materials and products are reused as resources, the financial, global environmental, social and other impacts are quantified to assess the true value of the material. The global environmental aspects are calculated in terms of greenhouse gas emissions, water and energy use.**
- **The main point that was taken care of when building the system was to create diagrams and charts to enable the system to suggest solutions visually. The goal is to propose such a solution quickly and achieve matching.**

(4) Matching platform

- **EME's matchmaking service leverages AI and machine learning to identify the best reuse and recycling opportunities for materials.**
- **The AI is asked the following questions and given a score. (i) Can it be reused in the same industry and use Yes / No, (ii) Can it be reused as a different function Yes / No, ... recycling is the worst.**
- **EME lets AI learn to make maximum use of materials through data. EME recognizes that reuse is a top priority approach from organizational, social and economic aspects.**

(4) Matching platform

- **For example, check whether a railroad track can be used as a track in the same way, if not, check whether it can be used elsewhere, and check whether it can be used for any other purpose at a construction site. In one case, EME checked whether it could be reused to construct a bicycle parking lot from the tracks, or if a train window could be reused as a window in a new building.**
- **Liquid waste is difficult to evaluate. There are also transactions with chemical companies, but it is difficult to separate each component. Mixtures with metals and textiles can also be difficult.**

(4) Matching platform

- **Matchmaking process (matching waste with companies that need it),**
 - i . **Scanning (data is imported by AI)**
 - ii . **AI matching**
 - iii . **Scrutiny of whether the match by AI meets the needs**
 - iv . **Matching is completed**

Effects of using the EME system

(1) Utilization for determining insurance coverage

- **The Resource Passport has proven to be an effective tool for insurance companies. It is also used to examine where and how insured items are used and whether they should be insured.**
- **Therefore, in order to minimize the risk of the company, it also provides value for insurance coverage. If it can be used as a resource, insurance is not required, and if there is a possibility of damage and a claim when used, insurance is applied. Although insurers may lose customers, they consider it important to provide value in a risk-free manner.**

Effects of using the EME system

(2) Utilization of AI

- **The use of AI is helping to enrich and upload data. It serves as a platform for accumulating detailed information on waste and for identifying individual information.**
- **The use of AI is helping humans and organizations make various decisions. Organizations in the marketplace are using data statistically to help them how to make decisions and what to simplify when business hours are limited. In the course of actually setting up EME projects, AI and machine learning are effective in collecting information on waste. It is important to recognize what AI can do.**

Effects of using the EME system

(3) Needs for information disclosure

In the market, there is a need for various stakeholders to disclose their materials. By disclosing information in the area of the market that deals with different materials, the EME plays a role in connecting markets in different industries. By obtaining information on companies and materials in different fields, there is a possibility that new materials will be discovered. It should be used effectively to consider auctioning things as materials rather than storing waste.

EME Challenges

It was a very difficult initiative for EME to set up such a system to actually influence the economic aspects of the system. EME would like to match waste with companies that need it, but there is no data on waste. Waste and procurement information is important prior to matching. At the same time, there is a shortage of actual resources and human resources. The certification system for resource recycling and matching is also insufficient. There is also a lack of an insurance system for resource recycling. In such a situation, it is difficult to move from a linear economy to a circular economy.