



CaReborn

38. MAE2

New carbon from your trash

PRESENT SITUATION

Here at MAE2, we are proud to announce that our new product, **CaReborn**, has paved the way to create new products from plastic waste by decomposing them into atoms and reforming the material from those extracted atoms. In recent years, plastic waste has been a great issue in the world because of its impacts on the environment, especially the ocean. For instance, around 8 million plastic waste is dumped into the ocean every year and 150 million plastic wastes exist in the ocean now. Those plastic can be broken down into microplastic which can get into marine organisms' bodies and harm them from the inside. Thus, we can say for sure that we are facing a serious problem because of plastic waste, and it is necessary to recycle and tackle this issue. However, for now, only 9% of the world's plastic waste is recycled.

Additionally, although 86% of Japan's plastic waste is recycled, 62% of them are thermal recycling, simply burning the waste and using the heat from it, which is not globally accepted as recycling. On the other hand, Chemical recycling, which breaks down plastic into molecules and gas, occupies 3% of Japan's plastic recycling. As the proportion implies, chemical recycling has been found to be not useful, due to the money and energy required for the process with the current technology, making it hard to spread this recycling system over the world.

THE SCIENCE

CaReborn creates new products with carbon atoms extracted from the plastic wastes that are dumped into **CaReborn**. The procedure includes three steps.

1. Crushing the plastic wastes

Firstly, it crushes the plastic waste into smaller pieces to foster its decomposition in the second process.

2. Decomposing

CaReborn extracts carbon atoms through plasma pyrolysis, a technology that makes chemical reactions occur without oxygen at high

temperatures of around 5000 degrees[1]. This circumstance accelerates the chemical reaction while preventing chemical impurities from mixing in and enables the generation of high-purity carbon atoms in a short reaction time. Because the time spent on the process is shortened, the energy consumed will also be lessened compared to other existing technologies.

Also, aluminum oxide (Al_2O_3) is used as a catalyst to save time and energy so we can reduce the cost in the decomposing process.

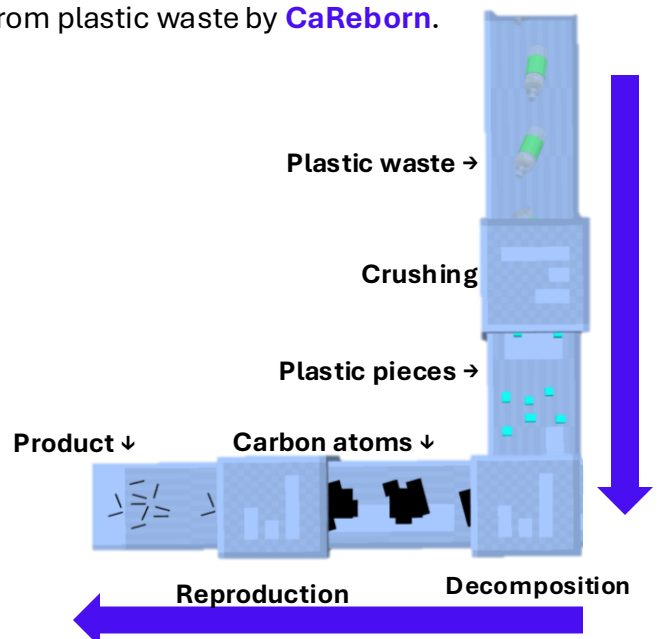
3. Reproducing

The technology in other companies extracts only carbon compounds, so the number of new products made with them is limited. However, **CaReborn** can extract carbon atoms themselves, so it allows us to create almost anything with **CaReborn**. The number of products that can be generated with **CaReborn** is estimated to exceed 1,000.

Examples of products made with **CaReborn** include oil, alcohol, carbon nanotube, and graphite.

Assuming that all carbon in 1kg of PET($\text{C}_{10}\text{H}_8\text{O}_4$) is converted into the product, **CaReborn** can produce 620g of carbon atoms, which is equal to 24800 mechanical pencil leads and 744g of coal oil.

The picture below shows how products are made from plastic waste by **CaReborn**.



Competing products

○POLYSTAR

This is a pelletizer dedicated to plastic.
When we put used plastic such as vinyl and FRP into the machine, they can be crushed, mixed and become pellets [2]

○Non-rigid plastic recycle machine produced by SYOKEN Corp.

When we put used non-rigid plastic into the machine, they can be crushed and separated with soil, and finally, they become PP/PE pellets [3]

○Rigid plastic recycle machine produced by SYOKEN Corp.

When we put e-waste into the machine, it crushes, separates, and washes it. Then, the machine can separate e-waste material into PC, PP, PS, PE, and resin.

It can also separate materials based on colors as well [3]

⇒How to differentiate our product from competing products?

The competing products are limited in recycling ways (only separate materials, only possible to remanufacture pellets)

Also, competing products undergo many processes, and remanufacturing new materials takes a long time.

On the other hand, **CaReborn** uses the latest science and technology to instantly decompose and recombine the atoms and it allows us to produce new materials in a very short time.

In addition, the competing products are very large, and they require a very large space, and the install cost is so expensive. But **CaReborn** is a small machine with a simple structure that requires only a little space. Also, the install cost is much lower than competing products. Furthermore, many Japanese companies finish processing used plastic by exporting it overseas. However, exporting overseas is expensive and time-consuming, and emits greenhouse gases in the process of transportation, which is a burden to the environment. With **CaReborn**, plastic recycling can be done in the factory, with no transportation costs, and with less environmental impact. Besides, by conducting this kind of plastic recycling business in Japan, the Japanese people will become more familiar with plastic recycling, which will lead to increase recycling awareness in Japan. This will promote environmental protection activities as a whole.

REFERENCES

[1]<https://jp.kindle-tech.com/faqs/what-is-plasma-pyrolysis>
[2]<https://www.fareastnetwork.co.jp/theme293-2/polystar/>
[3]https://www.hasaifunsai.com/lp-recycle.html?gad_source=1&gclid=Cj0KCQjww_m-BhC4ARIsAlqNeBtmMlwVlWMwLmCWNRRX7hPQwodiUJrrMW0G1cCp6HR7t8qq6C_m2nUaAoAzEALw_wcB

Financial Plan(¥)

The price of **CaReborn** is ¥40,000,000, ¥10,000,000 for setting up, ¥1,000,000 for maintenance, and ¥20,000,000 for running the machine. Also, the catalyst costs ¥40,000,000 per year. So, even after the first sales, the sales continue to grow. From the fifth year, **CaReborn** is assumed to be exported to other countries. The break-even point is at the 2nd year, and in the 10th year, the profit will be over 140 Billion yen.

| Year | 1 | 5 | 10 |
|-------------------------|------------|-------------|-------------|
| New Costomer | 10 | 1000 | 3000 |
| Total N of Costomer | 10 | 1660 | 4660 |
| [Profits] | | | |
| Facility setup | 100000000 | 10000000000 | 30000000000 |
| Machine | 400000000 | 40000000000 | 1.2E+11 |
| Maintenance | 10000000 | 1000000000 | 3000000000 |
| New costomer's catalyst | 400000000 | 40000000000 | 1.2E+11 |
| Catalyst replacement | 0 | 26400000000 | 66400000000 |
| Running cost | 200000000 | 33200000000 | 93200000000 |
| Total sales (Sum) | 1110000000 | 1.506E+11 | 2.462E+11 |
| [One Time Expenses] | | | |
| Technology development | 3000000000 | 0 | 0 |
| Customer Support Setup | 2000000 | 0 | 0 |
| Testing prep | 20000000 | 0 | 0 |
| Testing | 100000000 | 0 | 0 |
| Patent application fee | 242600 | 0 | 0 |
| [Recurring Cost] | | | |
| Advertizement fee | 300000000 | 90000000 | 50000000 |
| Machine production | 200000000 | 20000000000 | 60000000000 |
| catalyst | 40000000 | 6640000000 | 18640000000 |
| Customer support | 5000000 | 830000000 | 2330000000 |
| Shipping cost | 700000 | 70092000 | 35090500 |
| Labor Fee | 150000000 | 1500000000 | 25000000000 |
| Patent maintenance | 2500 | 7600 | 66400 |
| Sum | 3817945100 | 29130099600 | 1.06055E+11 |
| Total Profit(¥) | -2.708E+09 | 1.2147E+11 | 1.40145E+11 |

TARGET MARKETING

At MAE2, our mission is to solve plastic-related environmental problems such as marine plastic problems by recycling plastic waste at a low cost and low energy. Therefore, our customers are local governments, and we would like them to introduce our technology in their garbage treatment plant. They are responsible for the usage of their local waste, so we would like to offer them a new option of how to recycle their plastic waste. Our target is not only the domestic local governments but also the local governments in other countries and companies overseas. By doing this, we would like to spread this new possibility for plastic recycling to the world. Furthermore, since our technology is new and difficult to use, our staffs will go to each garbage treatment plant to teach them how to use it.