

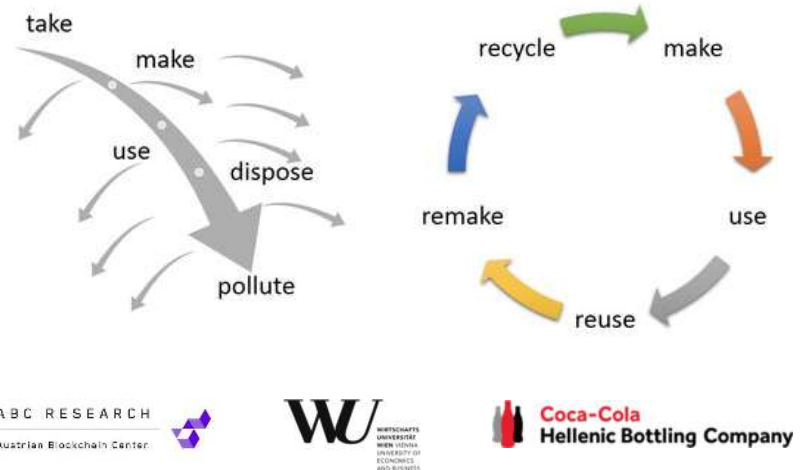
**ABC**  
**Austrian Blockchain Center**

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Centre (K1)

Type of project: Supply Chain & Trade Finance, 10/2019-09/2023, multi-firm

### Circular Plastic Supply Chain



## INCENTIVIZATION BY BLOCKCHAIN TECHNOLOGY

### REDUCING PLASTIC WASTE THROUGH BLOCKCHAIN-BASED INCENTIVIZATION – THE CASE OF THE PLASTIC BOTTLE SUPPLY CHAIN

The use of blockchain technology has not only enabled use cases like cryptocurrencies. Also token economic systems can be created that manage to incentivize people on various levels. In addition, tamper-proof and validated data can help to track goods and waste along the supply chain.

In this research project we developed an incentive model and a proof-of-concept to investigate the impact of blockchain technology on plastics supply chains to reduce plastic bottle waste and to positively influence recycling behavior of consumers. We chose to explore the point of sale and consumption process, which could be expanded along the whole supply chain (e.g., transport, storage, recycling).

As plastic provides several advantages to other types of packaging it is still widely used today. To reduce

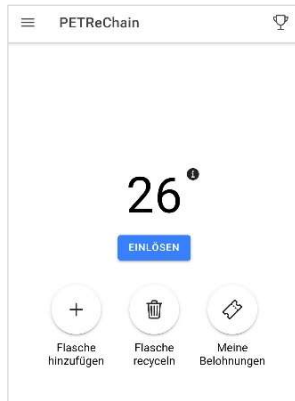
waste and emissions it is important to increase the percentage and quality of recycled materials. Several studies show that purely monetary incentivization does not produce an optimal outcome and that achieving intrinsic motivation performs better. Thus, token economic systems might be ideally suited to motivate consumers more efficiently.

#### Pilot study with blockchain-based recycling app

In this project, we conducted a pilot study to test several types of incentives and evaluate the effectiveness in a real-world setting. Plastic bottles with individual QR codes to enable tracking and tracing were sold at a participating restaurant. Consumers installed an app to register the bottle at the point of sale and when returning the bottle at one of several recycling points. The system granted reward tokens to

## SUCCESS STORY

participating consumers, which could be redeemed in several ways. The investigated incentives were a lottery, donations to NGOs and gamification via a highscore list.



User interface of the recycling app

Data storage and the server-side logic were realized via a permissioned blockchain that manages data in a transparent yet privacy-compliant way.

### Impact and effects

It is important to increase the collection rate of plastic bottles to achieve higher recycling rates and reduce

waste. Incentivization via recycling apps can help to achieve this goal.

In our limited-scale pilot study, over 30 adopters registered bottles and recycling processes in the app. 49% of the rewarded tokens were donated to NGOs, while 20% were exchanged for lottery tickets. The remaining tokens just contributed to the highscore list. This shows that different incentive options are accepted by the consumer.

Based on the results of the pilot study we developed a simulation model to show the effects of app-based tracking-and-tracing. This model indicates a potential increase in the recycling rate compared to the base scenario. Overall, the project showed that the combination of tracking and tracing together with a token-based reward system provides a feasible solution for plastic bottle recycling.

The results of the pilot study and the simulation indicate the potential of using a blockchain-based system for incentivization of appropriate recycling behavior to move towards a circular economy.

### Project coordination (Story)

DI Dr. Stefan Craß  
 Senior Researcher  
 ABC Research GmbH

T +43 (0) 50 262 – 242  
[stefan.craß@abc-research.at](mailto:stefan.craß@abc-research.at)

### ABC – Austrian Blockchain Center

ABC Research GmbH  
 Favoritenstraße 111  
 1100 Wien  
 T +43 (0) 50 262

[office@abc-research.at](mailto:office@abc-research.at)  
[www.abc-research.at](http://www.abc-research.at)

### Project partners

- CCB Management Services GmbH, Austria
- Vienna University of Economics and Business, Austria



This success story was provided by the centre management and by the mentioned project partners for the purpose of being published on the FFG website. ABC – Austrian Blockchain Center is a COMET Centre within the COMET – Competence Centers for Excellent Technologies Programme and funded by BMK, BMDW, and the provinces of Vienna, Lower Austria and Vorarlberg. The COMET Programme is managed by FFG. Further information on COMET: [www.ffg.at/comet](http://www.ffg.at/comet)