**Kaumera Combustions by Nesie Junyi Wang**

Kaumera is an innovative biopolymer harvested from bacteria aggregates that fed on sewage, with untapped potentials. Among its many intriguing properties, one that stands out is its fire retardancy, a focus of research under the NOW Closed Cycles. In collaboration with researchers from TU Delft, my project delves into the unique materiality of Kaumera, experimenting it as a fire-retardant ink for printmaking. This artistic endeavor involves silkscreen prints that are meticulously hand-processed, employing combustion as a pivotal transformative process, redefining the act of creation and destruction.

In conventional waste treatment, the process of combustion condenses the degradation of objects from years into mere seconds. Contrastingly, in urban areas near water bodies, human waste often lingers, floating and decaying. Once discarded by humans, these objects find new life as they are reclaimed by diverse living organisms in the water.

Intrigued by the story behind Kaumera, I’ve begun to view these discarded objects from a different perspective. What if we perceive these items, traditionally deemed as waste, from the standpoint of more-than-human entities? Can the metamorphosis of life forms be discerned through the medium of flames? This work seeks to illuminate the intricate relationship between human waste in water, the materiality of Kaumera, and the transformative art of combustion. It challenges us to reconsider our perception of waste, not as an endpoint but as a part of a broader, more inclusive narrative that encompasses more-than-human perspectives.

This work would not have been possible without the invaluable contributions of several key individuals. I am deeply grateful to Prof. Dr. Stephen Picken, Dr. Yuemei Lin, Bram Verkooijen, and Dr. Suellen Pereira Espindola for introducing me to the fascinating world of Kaumera. Additionally, my sincere thanks go to Thomas Atikum and Guido van der Linden for their expert guidance throughout the creative and craft processes.

Kaumera: new cooperative and startup company accelerate development

**Kaumera takes a big step forward. Four Dutch water authorities are working together in a new cooperative responsible for production. A new startup BV takes charge of market operations. This BV, Kaumera Sales and Services BV, is owned 50/50 by Royal HaskoningDHV and the Kaumera cooperative, taking the production of this biobased raw material into a new phase. Market interest in Kaumera has been demonstrated in recent years. It is now time to accelerate the development with more capacity and focus.**

**About Kaumera**

Kaumera is extracted from wastewater. It has special properties and can be used in various applications as a substitute for petrochemicals. A consortium has been working on the development of Kaumera since 2013. In 2019, the international launch took place. Since then, great strides have been made in the production process and in developing market applications. Especially in agriculture, horticulture and forestry, there are good results in the use of Kaumera in biostimulants and for water retention in soil. Steps in finding promising applications have also been made in other markets such as the building industry.

**The Kaumera Cooperative**

This new cooperation brings additional commitment to the development of Kaumera. An innovation like this requires a lot of research. By combining their expertise and resources, the water authorities can do more research and share knowledge. In this way, they accelerate the product development that the market needs. The participants in the cooperative make decisions together on production and on the strategy for Kaumera's development.

The following four water authorities form the cooperative:

- Water authority de Stichtste Rijnlanden

- Water authority Limburg

- Water authority Vallei and Veluwe

- Water authority Rijn and IJssel

The water authorities are choosing this form of cooperation because they want to make a major contribution to the national government's goal of making our country fully circular by 2050. Therefore, together with partners, they are fully committed to the research, production and marketing of Kaumera.

The cooperative has started with four Dutch water authorities. The possibility is open for other water authorities to also participate in the future.

**Kaumera Sales and Services BV**

The new company is owned 50% by the cooperative and 50% by Royal HaskoningDHV. The latter has been one of the partners in the Kaumera cooperation from the beginning and is responsible for the development and supply of the technology.

Kaumera Sales and Services BV deals with marketing and sales. The BV also directs product development based on market demands.

This is a unique collaboration between the producing water authorities and a company with expertise in marketing innovative products.

**Support by EU LIFE grant**

To support the success of Kaumera, the EU LIFE program has given a new grant for the next 3 years. The grant aims to establish the two new organizations, further market approach and product development. This is the second LIFE grant from the EU. The first one ended successfully in 2023. Its main objective was to realize the production sites in Zutphen and Epe.

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[www.kaumera.com](http://www.kaumera.com)

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**Additional Information**

Kaumera is a new biobased raw material extracted from sludge granules formed in the Nereda® treatment process. It can be used in many cases as a substitute for petrochemicals. The Netherlands has the world first: the first production site is in Zutphen, a second plant is in Epe.

Because of its special properties, Kaumera can be used in many different applications. It can retain and repel water, it is fire retardant and is an excellent binder for composite materials, among other things. Since its introduction, many promising applications are under development in agriculture forestry and horticulture, the construction industry and in new materials and composites.

**The name**

Kaumera. It is a versatile name for a versatile product. Kaumera means "chameleon" in Maori, the language of New Zealand's original inhabitants. The chameleon is known to adapt easily to its environment.

**The Kaumera consortium to date**

The recovery of Kaumera from residual and wastewater has so far taken place within the National Kaumera Development Program (NKOP). In this program, Water Authority Vallei and Veluwe, Water Authority Rijn and IJssel, the Foundation for Applied Water Research (STOWA), engineering firm Royal HaskoningDHV and Delft University of Technology work closely together. Four other Dutch water authorities have supported the project from the beginning, including Water Authorities Limburg and De Stichtse Rijnlanden. They have now joined the cooperative together with Water Authority Vallei and Veluwe and Water Authority Rijn and IJssel.

**The extraction and sale of Kaumera add value to the water chain**

1. social added value

Kaumera replaces petrochemical raw materials in many applications. This provides clear environmental and climate benefits. This is in line with the ambitions of the Dutch water authorities.

In addition, less waste sludge needs to be disposed of. This significantly reduces CO2 emissions.

2. economic added value

In addition to the income from the sale of Kaumera, there is another economic factor. With traditional water treatment, residual sludge always remains. This must be disposed of by a waste processor. The production of Kaumera leaves less residual sludge. This results in significant cost savings when purifying water.

**Royal HaskoningDHV**

Royal HaskoningDHV is an independent firm since 1881 that combines engineering, design and consultancy services with software and technology to deliver more added value for clients. From our mission 'Enhancing Society Together', we take responsibility to have a positive impact on the world and contribute to the UN Sustainable Development Goals. We challenge ourselves and our clients to develop sustainable solutions to issues related to the built environment and industry. Our more than 6,000 colleagues, spread across offices in more than 20 countries worldwide, work with customers on future-proof solutions, from climate change and digital transformation to changing consumer demands and the energy transition. Our portfolio of wastewater treatment products provides a toolbox of proven, biological ways to improve the performance, capacity and sustainability of treatment plants.

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