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SUSWAM– Sustainable waste management in Karelia and Kainuu

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CIRCULAR ECONOMY AND WASTE MANAGEMENT IN THE ARCTIC

26.01.2023 Oulu



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SUSWAM Project Summary

- Problem: Major challenges in waste collection and treatment, i.e., transport of hazardous waste from Kainuu to Riihimäki
- Need analysis: Treatment of the harmful waste fractions locally
- Objective: Reduce waste-based harmful effects on environment in Kainuu and Karelia, achieved by improving waste sorting and processing.
- Project duration 1.12.2019 – 31.07.2023
- Project partners: KAMK, Ekokymppi, Entrinki, Kostomuksha City Administration, Kostomuksha landfill, RK Water & Ecology consulting company



Project Activities

Benchmark current waste management practices in Karelia and Kainuu

Operating models for sorting of municipal solid waste (RUS)

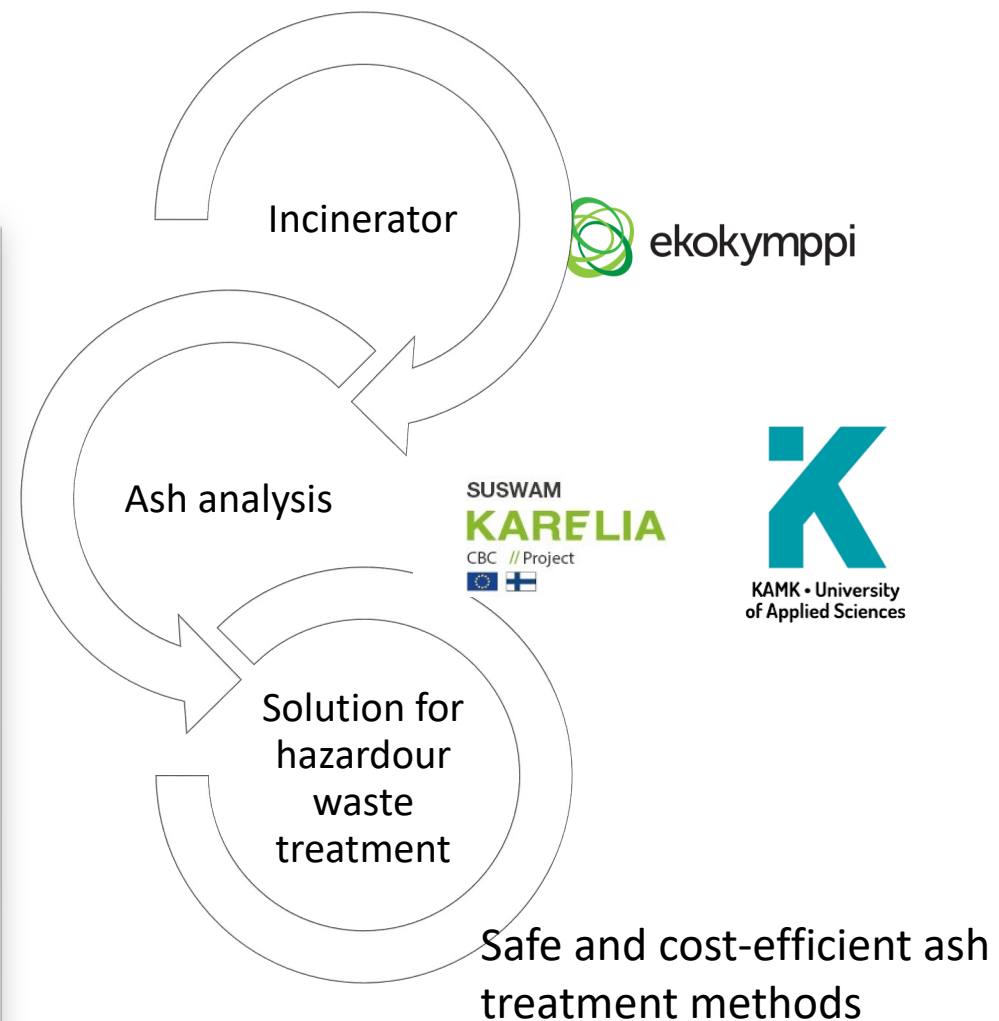
Waste sorting infrastructure (RUS)

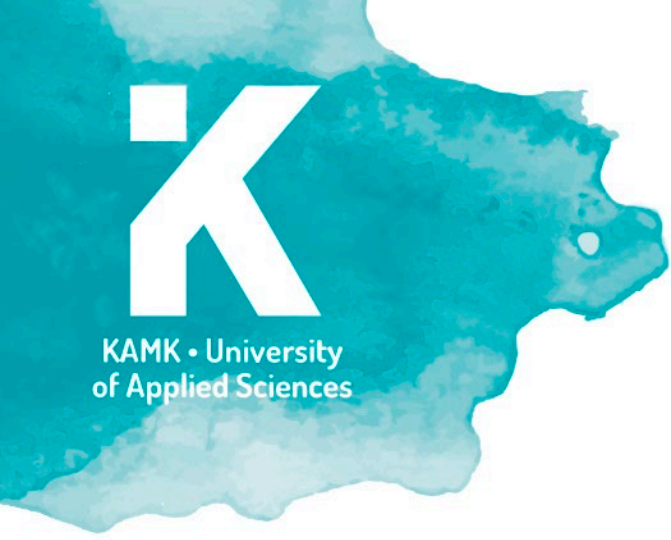
Hazardous waste treatment in Kajaani



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Knowledge management and Capitalisation





Project Context

General

- COVID-19
- Russian conflict

Project –specific

- Technical difficulties with incinerator
- EU regulations



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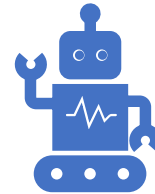
Current situation



Benchmark current waste
management practices in
Karelia and Kainuu



Operating models for sorting
of municipal solid waste (RUS)



Waste sorting infrastructure
(RUS)



Hazardous waste treatment in
Kajaani





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Hazardous waste treatment in Kajaani

Regional development plan to
treat toxic and hazardous
waste in Kainuu

Using methane (landfill gas)
as a co-combustion fuel for
incinerator





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What went wrong?

- Incinerator was not suitable for using landfill gas
- No previous references provided by UK supplier
- Lack of information transparency
- Repair works
- No possibility to receive ash from other supplier



Decision: change the project plan



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Landfill wastewater operations

Research

- Landfill leachate pre-treatment – **TSS assessment and removal**
- Landfill leachate treatment – **ammonium recovery**

Pilot

- Research-based coagulant aid introduced
- Ammonium recovery by NUTRICON technology

Implementation

- Improvement of overall leachate treatment by upgrading the pre-treatment operations and its monitoring system



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Research activities driven by operational needs

Looking for improvement of landfill leachate pre-treatment operations (coagulation)

- Consultations with coagulant suppliers (Kemira, Solenis)
- Receiving test samples of promising coagulants for lab tests
- Screening of coagulants on leachate samples
- Research-based choice to proceed with piloting activities

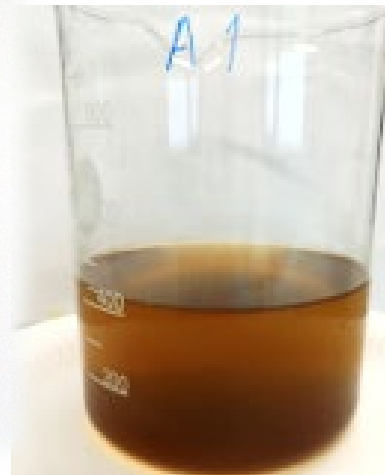
Perspectives for landfill leachate

treatment operations (nutrient recovery)

- ❖ Adaptation of the developed nutrient recovery technology for landfill leachate treatment
- ❖ Evaluation of substitution materials for operational sustainability
- ❖ Integration of new approach with landfill leachate treatment scheme for piloting



before



after



Regional waste operator Ekokymppi



Piloting at landfill leachate treatment facility

- Adsorbent – Bulgarian zeolite
- 8 weeks of operation
- About 4,7 kg of ammonium recovered

The logo of KAMK University of Applied Sciences, featuring a stylized white 'K' on a blue background that resembles a map of Finland.

Over five years of development and networking

- 2013-2014 GeoMaterials – Geopolymeeri- ja geomateriaalipohjaiset side- ja adsorbenttimateriaalien kehittäminen (Kainuun Liitto, EAKR):

Geopolymer materials, binders and adsorbent development

- 2015-2017 GeoSorbents – Uudet geopolymeeripohjaiset vedenkäsittelymateriaalit (Business Finland, EAKR):

New geopolymer-based materials for water treatment applications

- 2016-2018 KANTELI - Kansainvälinen Teknologialiiketoiminta (Kainuun Liitto, ELY):

International high-tech businesses, emerging technologies for wastewater treatment sector

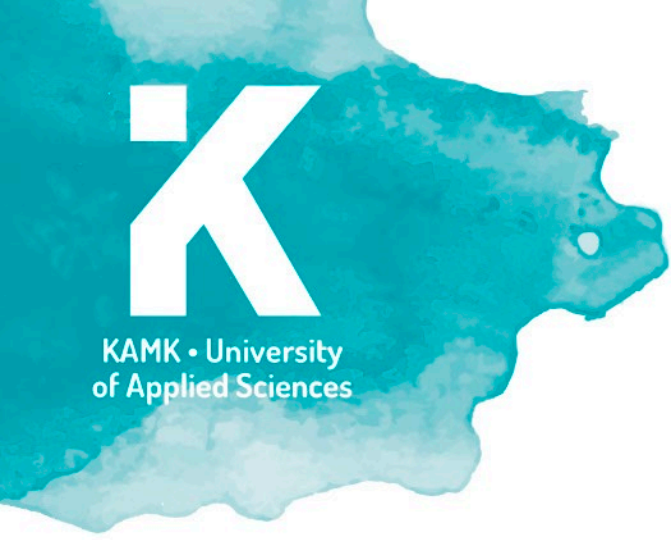
- 2018-2022 WaterPro - Kiertotalouden uudet prosessit veden ja jäteveden käsittelyssä (Keski-Pohjanmaan Liitto/Kainuun Liitto, EAKR): **New processes of circular economy in water and wastewater treatment**
- 2019 – 2023 **SUSWAM, REMAC**
- **What's next? Supplementary source of nutrients for enrichment of composting to close the loop**
- **Upgrading technology for onsite digestate treatment for producing supplementary source of nitrogen**



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Additional project changes

- Clean Games in Finland
- Separate textile waste collection from 1.1.2023 (legislation)
- Pilot of textile collection in Kainuu



Clean Games



Interactive concept to promote environmental awareness

Game players compete in teams in collecting and sorting street litter, which is transferred into game points

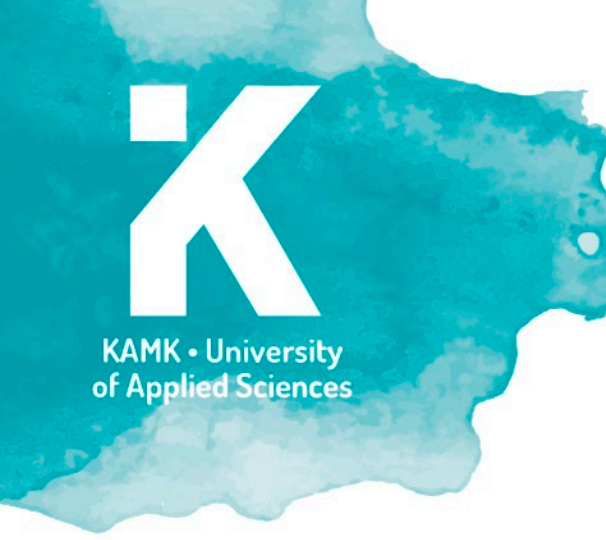
Play-based methodology (mobile application)

Promote outdoor activity, family gathering, territory development, environmental volunteering

Relate to the UN Sustainable Development Goals.

Organised 4 times in project (Russia x 1, Finland x 3)





- 5th May 2022
- 339 participants (329 players, 89 teams)
- 670 kg of mixed waste collected in 1 hour
- Support of educational institutions
- Valuable feedback



8th World Congress on New Technologies, as part of the 12th International Conference on Environmental Pollution and Remediation, 3.-5.08.22, Prague



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Capitalisation as Knowledge Management tool

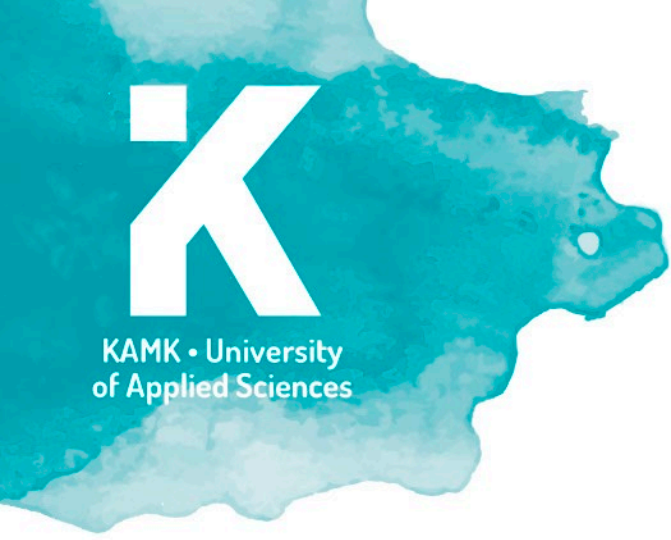
- **“Learn and Share” typology** (reaching out targeted stakeholders, tailor-made products and clustering for synergies and complementarities)
- Target : mainstreaming of the practices in the work of local administrations in charge of waste management
- Knowledge generation, results reuse
- Connection with broader EU policies (circular economy).
- Expanding network beyond the cooperation area.



Awareness rising and Communication



- ❑ *WasteTech, Moscow, 2020*
- ❑ *International webinar “Waste or Raw material?” 2021*
- ❑ *12th International Conference on Environmental Pollution and Remediation, Prague 2022*
- ❑ *N-Recovery - Workshop on Nitrogen Recovery by European Sustainable Phosphorus Platform, Brussels, 2023*
- ❑ *Benchmarking and knowledge sharing with waste management cluster in Norway (Tromsø) 2023*
- ❑ *Number of research publications on nutrient recovery*
 - New Clean Games
 - New project applications in textile recycling, waste management and nutrient recovery (Interreg Aurora and NPA)
 - New research publications



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Questions & Comments?

- What do you think of the Clean Games concept?
- Do you see the future of it in your city?



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