

Renotech R&D Ash2Cash Concept

Novel Binders from Ash

Ash2Cash Concept



Ash Chemistry:

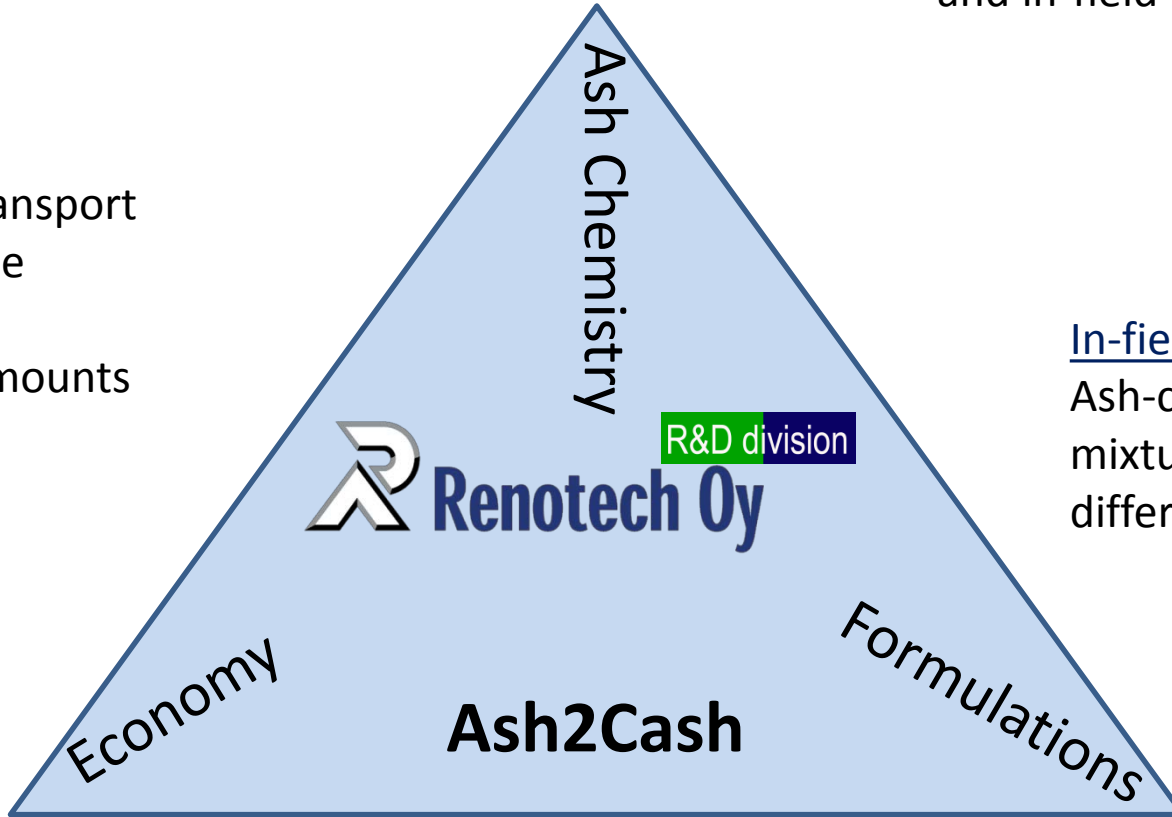
In-situ upgrading of ash reactivity during combustion and in-field modifications

Logistics:

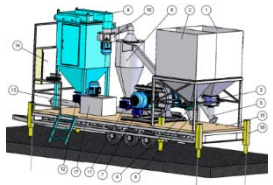
Optimizing transport routes, storage options and production amounts

In-field receipts:

Ash-cement/lime mixture recipes for different applications



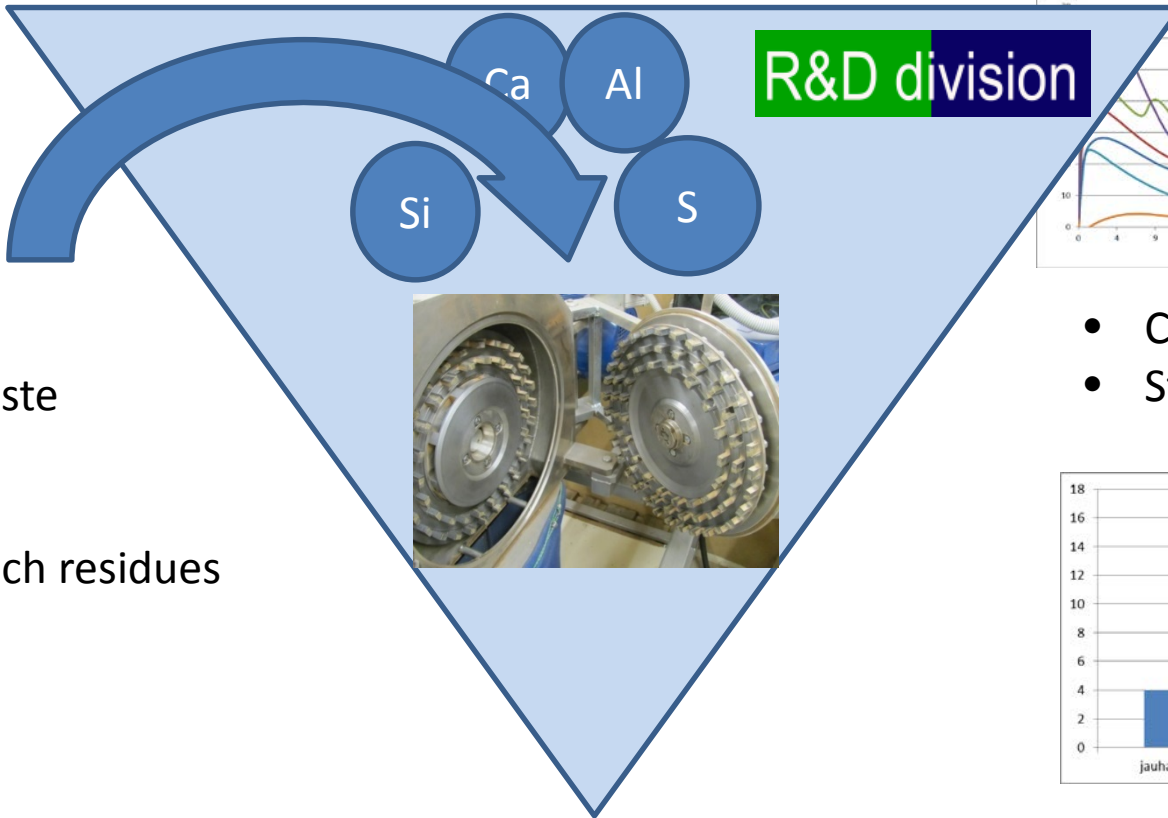
EkoMill



Mechanochemical Activation

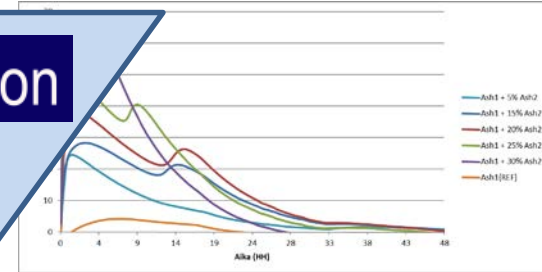
Sidestreams for Utilization

- Bioash
- Coalash
- FGD
- Gypsumwaste
- MEESA
- VLS
- Other Ca-rich residues

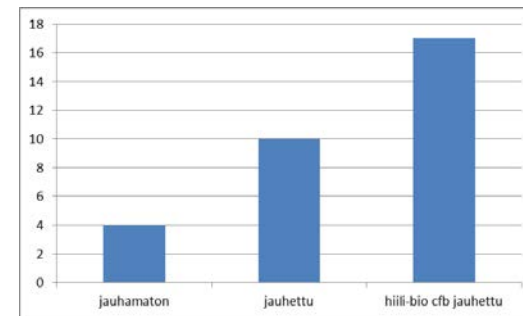


Green Binder

Quality Control



- Chemical Stability
- Structural Quality



Ash to Soil Construction

Mobile Processing Pilot Unit Based on Mechanical Activation



Ash
800 kg/h

Activation
Mill

100-300 kg/m³ of
Binder/m³ of soil

Cement or
Lime
100-200kg/h



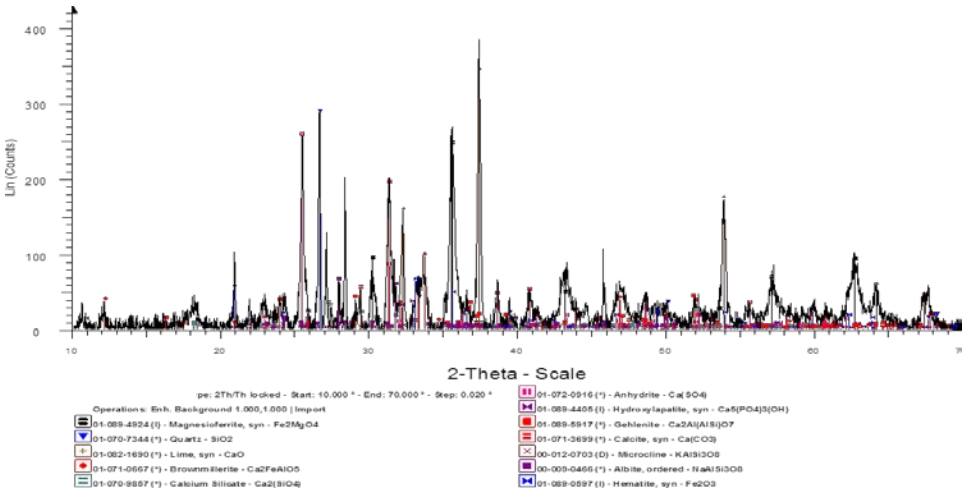
CASE Example:

20 000 kg of Ash Processed in 3 effective working days

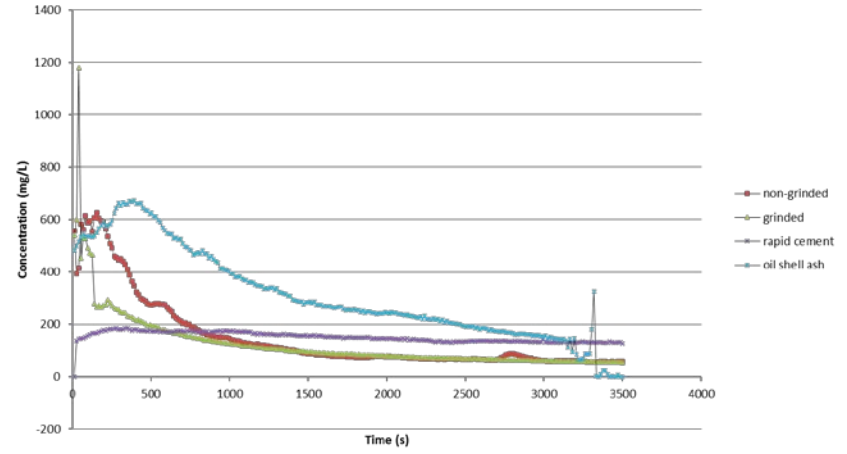
Ash replaced 80 % of Cement used

Quality Control System

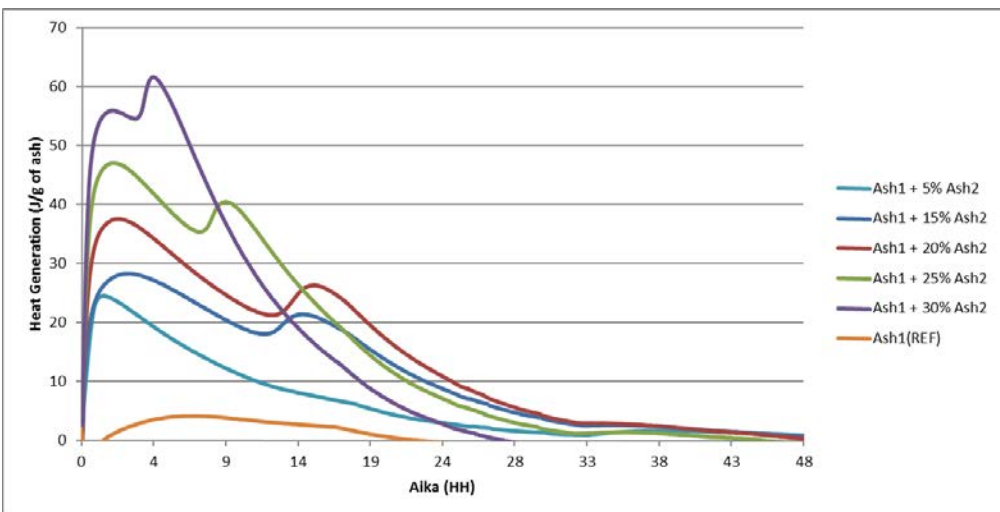
Composition and Structure by XRD



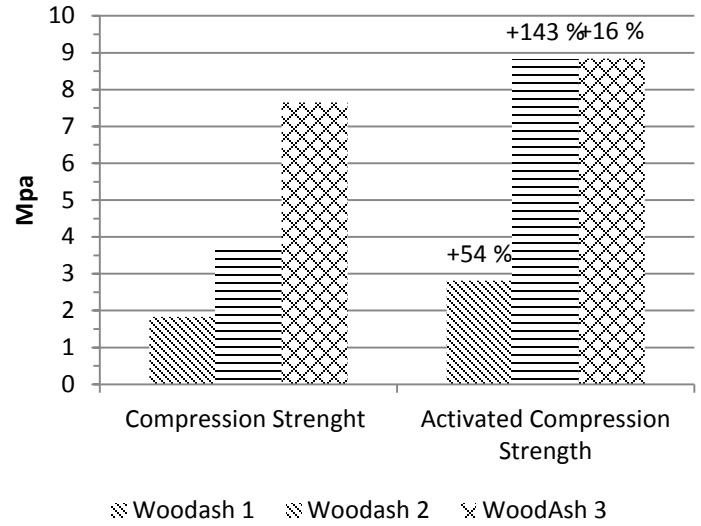
Leaching/reaction kinetics by ICP/OES



Reactivity by calorimetry



Long time effects and durability

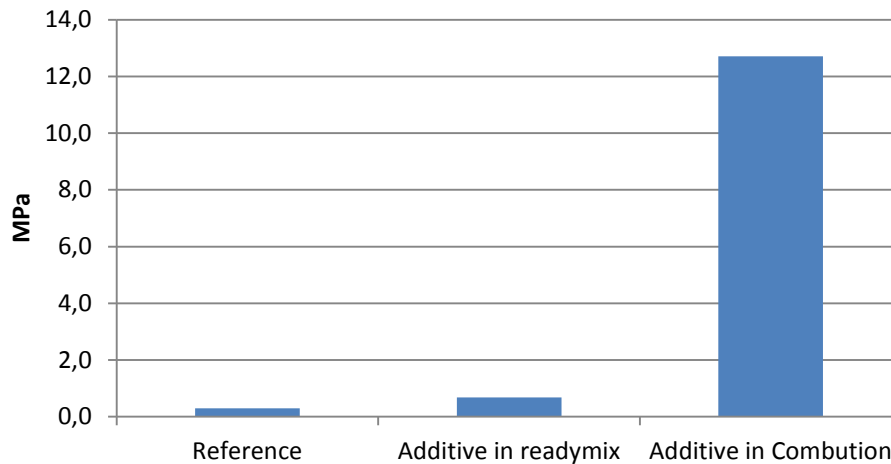


References

PILOTS

- Additives in pilot scale CFB 60 kW
- Additives in full scale CFB 120 MW (Spring 2015)
- Additives in full scale CFB 400 MW (Confirmed Autumn 2016)

Effect of Additives



- Logistic network for Land, Sea and Rails
- Cooperation Agreement with Major Construction Company in Finland
- Ongoing Discussions with many Plants between 20 – 400 MW CHP-plants.

R&D division



Ash utilization Network



Ash Chemistry and Modifications

EKOKEM
Säästämme luonnonvaroja
Ash Management



Ash utilization for soil stabilization

Ash to Cash



Ash utilization for soil construction



Ash to Sea Logistics

Ash Producers:

Fortum/ TSE, Jyväskylä Energy, Eesti Energy, Ahlholmens Kraft...

Some of our partners



So far . . .



The Team

Bob Talling, CEO

Entrepreneur with 30+ years of international experience in chemical engineering, construction materials, insulation and marine businesses of which 21 years as CEO and entrepreneur of Renotech Inc. He is a leading material expert in the field of cement, concrete, alkali activated materials, geopolymers, and use of side streams and waste materials in the circular economy.

Valter Wigren, R&D Manager

Responsible of developing “Ash to Cash” concept together with Bob. He specializes in ash chemistry and mineralogy, with an emphasis on introducing desired properties in ashes. He also develops milling technology and has a deep understanding of the Mechanochemical Activation processes related to high intensity grinding.

Kristian Gunnelius, Laboratory Manager

Kristian is an experienced engineer in the areas of suspension rheology and quantitative XRD analysis. He has been working with semi-adiabatic calorimetry of ash and concrete mixtures. Another strong area of knowledge is the analysis of particle surface properties including zeta potential, surface charge and surface area analysis

Patrycja Piotrowska, High Temp. Engineer

She is an expert in energy conversion with the focus on combustion properties of solid fuels, and has been working with biomass and ash characterization techniques since 2007 evaluating ash related operational problems such as agglomeration, slagging, deposit formation and risk of hot temperature corrosion

Gaurav Das, R&D Engineer

He is working with developing pre-treatment strategies for various industrial waste materials in the power generation and other industries. His studies also involve converting wastes and other side streams of these industries into eco-friendly multi-application oriented high value commercial products, such as Zeolites

Ville-Pekka Johansson, Ash Logistics

Ville is our logistics system planning and logistics cost calculation specialist. As he has experience as an R&D engineer in the fields of resins, colorants and polymers he has a strong background in the chemical industry, including hands-on involvement with international technology transfer.