removAL
removing waste from alumina production

Removing the waste streams from the primary Aluminum production in Europe

Aluminum production in Europe creates
6,850kt of bauxite residue (red mud) yearly

is Europe stuck in the mud ?

RED MUD FACTS

The Bayer process has a high bauxite residue yield
For each tonne of alumina produced, **0.9-1.5 tonnes of solid bauxite residue** are generated, depending on the initial bauxite-ore grade and the alumina's extraction efficiency

Bauxite residue is not utilised industrially
Ahough zero-waste processes have been succesful in the lab, **only 3% of the annual bauxite residue** production is industrially utilised worldwide

Bauxite residue is stockpiled on land
The limited land availability for bauxite residue disposal, threatens the longevity of established alumina refineries

RemovAL overcomes the barriers of economic viability by pooling together and integrating proposed stand-alone solutions, while adhering to the following principles:

- treat waste with waste
- recover valuable critical metals
- develop marketable products
- customise the solution to the industrial ecostystem of each alumina plant

near zero-waste processing, near break-even flowsheets

6 innovative pilot plants across Europe

Combined they will form a **network of technological nodes**, enabling optimum processing flow sheets for valorising the produced bauxite residue

The validation will be done for 3 European alumina producers (representing 44% of the European alumina production) and one legacy site owner

1 de-alkanization

Demonstrate at pilot scale the de-alkalization technology to remove alkali content from bauxite residue at levels below 0.5% wt, making it suitable for various applications

At least 40 t of bauxite residue will be processed by AAL at a mobile pilot plant in IRELAND

2 green soil stabilizer

Demonstrate the use of processed bauxite residue as green soil stabilizer for civil works applications, though the stabilization of bauxite residue with other industrial by products

At least 800 t of bauxite residuewill be processed and used by ACCIONA as a raw material for the construction of a road in Spain

3 lightweight aggregates & high performance binders

Demonstrate at pilot scale the production of lightweight aggregates and high performance binders, through different thermal treatments of bauxite residue

At least 10 t of bauxite residue will be processed in the RIO TINTO Pilot plant in France

4 ferro-silicon alloy

Demonstrate at pilot scale the production of ferro-silicon alloy from Electric Arc Furnace (EAF) co-processing of bauxite residue with other industrial by-products, like Spent Pot Lining (SPL) form aluminium primary production

At least 50 t of Bauxite Residue will be processed in the AoG Pilot plant in Greece and in the ELKEM pilot plant in Norway

5 microwave furnace

Demonstrate at a prototype microwave furnace the production of metallic iron from processing bauxite residue with other industrial by-products

At least 250 kg of Bauxite Residue will be processed in CEINNMAT's mobile prototype plant in both Spain and Greece

6 hydrometallurgy

Demonstrate the production of REE concentrate, Ga concentrate, alumina/soda solution and rutile concentrate from the hydrometallurgical processing of engineered slags/sinters produced in RemovAL pyrometallurgical pilot plants. Ga is co-extracted both from the slag and the Bayer liquor

At least 500 kg of slag and 100 lt of Bayer liquor will be processed at RWTH/MEAB pilot plant in Germany

feasibility studies

for each of the 3 alumina producers and the 1 legacy site owner, detailing the optimum processing flow sheet for valorising the produced bauxite residue along with other industrial by-products, taking into consideration:

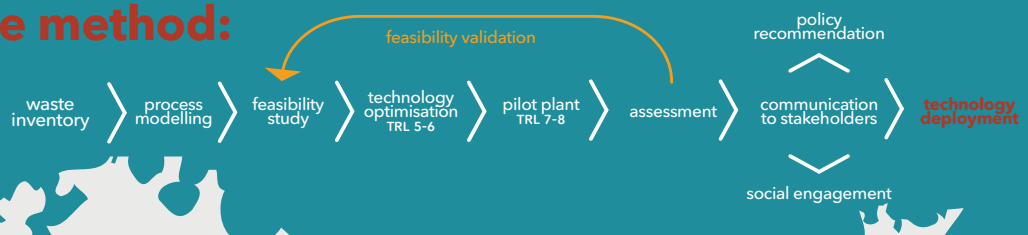
- waste characteristics
- logistics and
- symbiosis with other plants in the geographical vicinity

+

Demonstrate the production of new, marketable building products from the building materials produced in the pilot demonstrations

A demo house 25 m² will be built exclusively with bauxite residue building products in the housing settlement next to the AoG alumina plant

the method:



The research leading to these results has been performed within the REMOVAL project and received funding from the European Community's Horizon 2020 Programme (H2020/2014-2020) under grant agreement n° 776469.

www.removal-project.com