Miljömålsrådet
Protokoll

Sammanträdesdatum: 21 januari 2021

Sammanträdesprotokoll

Plats och tid:	Digitalt via Teams, 14.30-17.00
Närvarande ledamöter:	Rickard Malmström (MP), ordförande Markus Lagerquist (M), vice ordförande Rafael Waters (S) Dieter Joos (L) Jens Nilsson (S) Lovisa Johansson (F!) Samuel Dalevi (KD) Anette Fischer (V)
Övriga deltagare:	Anna Hilding, hållbarhetsavdelningen, kommunledningskontoret Åsa Tingström, kommunledningskontoret Stina Bergström, politisk sekreterare (MP) Anna Lundbom, marknadschef EasyMining
Utses att justera:	Markus Lagerquist **Paragrafer:** 1-5

Justeringens plats och tid:	Stationsgatan 12, 28 januari
Underskrifter:	

Rickard Malmström, ordförande

Markus Lagerquist, justerare

Åsa Tingström, sekreterare

Uppsala kommun

Miljömålsrådet
Protokoll

Sammanträdesdatum: 21 januari 2021

§ 1 Val av justeringsperson samt datum och plats för justering

Miljömålsrådet utser Markus Lagerquist att tillsammans med ordföranden justera dagens protokoll .

§ 2 Fastställande av föredragningslista

Miljömålsrådet fastställer utsänd föredragningslista.

§ 3 Digitalt studiebesök hos EasyMining

Föredragande: Anna Lundbom, marknadschef på EasyMining

EasyMing tillhör Ragn-Sellskoncernen och arbetar med olika kemiska processer för att utvinna och återanvända ämnen ur avfall som avloppsslam, flygaska och restvatten.

Anna Lundbom presenterade Ash2Phos, Project Nitrogen och Ash2Salt.

Mer utförlig information från presentationen finns i **Bilaga 1**, Presentation EasyMining, Miljömålsrådet 21 januari 2021.

§ 4 Nästa möte

Nästa möte sker den 22 april och kommer att vara en studiedag. Mer information kommer närmare mötet.

§ 5 Övriga frågor

Inga övriga frågor behandlades

PRESENTATION AV EASYMINING FÖR MILJÖMÅLRÅDET UPPSALA

Anna Lundbom

2021-01-21


EasyMining

EasyMining

Part of Ragn-Sells Group

GROUP FACTS 2019

RAGN-SELLS

En del av kretsloppet

Sales: 6 409 MSEK

Employees: 2 287

Markets: Sweden, Norway, Denmark, Estonia

Sites: 96

Material treated: 6.3 million tonnes

OUR VISION

“To be living proof that caring for the Earth and good business go hand in hand.”

RAGN SELLS

Patented processes for production of clean commercial products from waste streams

EasyMining´s business idea

“First I thought that there had been a mistake, but I then started to analyse the crystals and discovered that it was pure phosphate crystals. That ”mistake” got us to rethink, and we put a lot of work into understanding what had happened and utilising the knowledge to design a new system”

Yariv Cohen,
Development Manager at EasyMining

EasyMining

HISTORY

2007
EasyMining Sweden AB was founded
CleanMAP patented

2011
Ragn Sells AB enters as stakeholder

2014
Ash2Phos patented
Ragn Sells AB becomes majority owner

2015
Ash2Salt patented

2018
Enters partnership with Gelsenwasser for phosphorus recycling in Germany
Grows from 4 to 10 employees

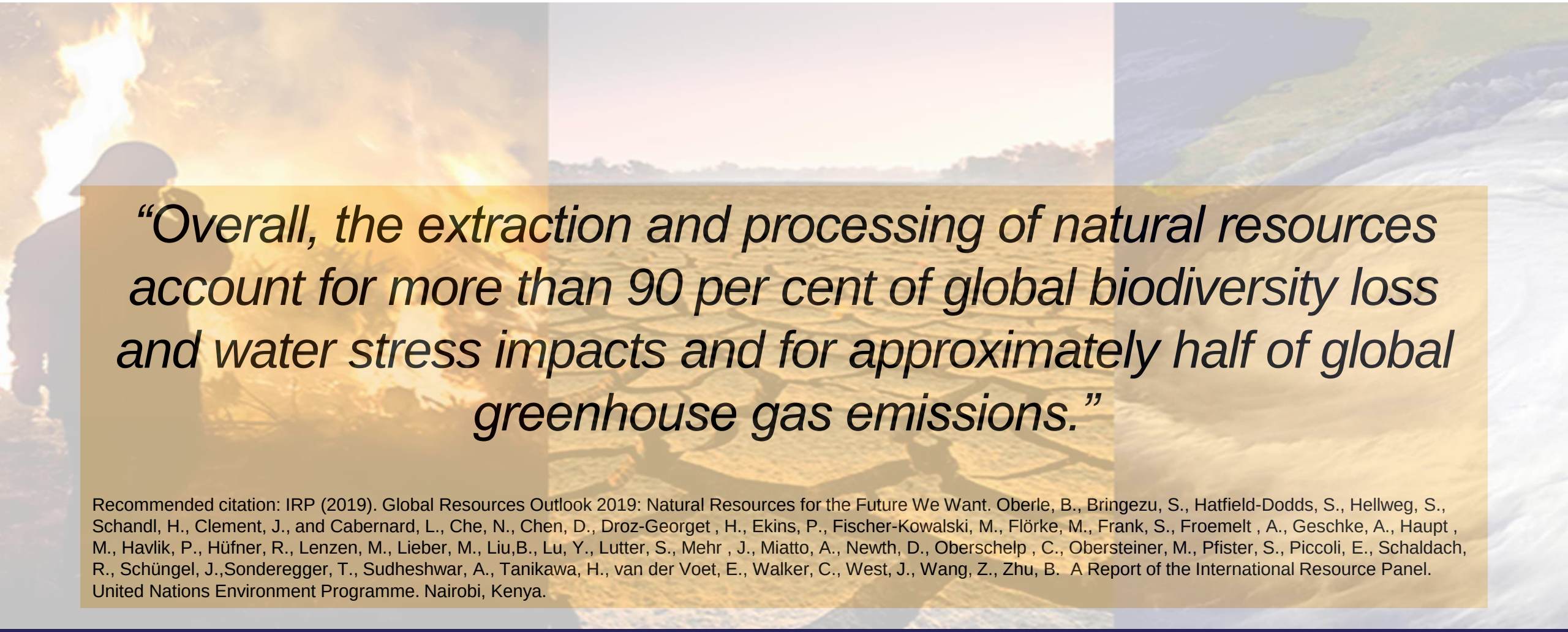
2019
Grows from 10 to 20 employees
Receives EU Life financing of 19 million SEK for Project Nitrogen
EasyMining is named “innovator of the Year 2019 at the Recycling Gala in Stockholm

ASH2PHOS
Extracting phosphorus from sewage sludge ash

ASH2SALT
Extracting potassium chloride from fly ash from waste incineration

PROJECT NITROGEN
Removing and recovering nitrogen from aqueous waste streams

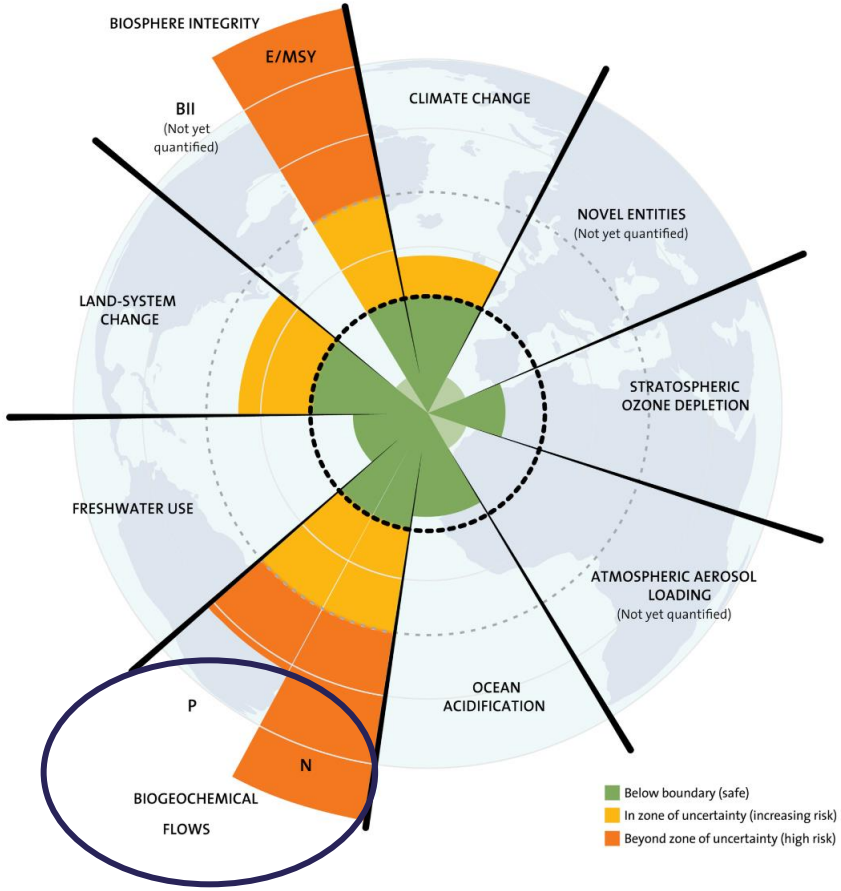
WHAT WE DO IS EXTREMELY IMPORTANT !



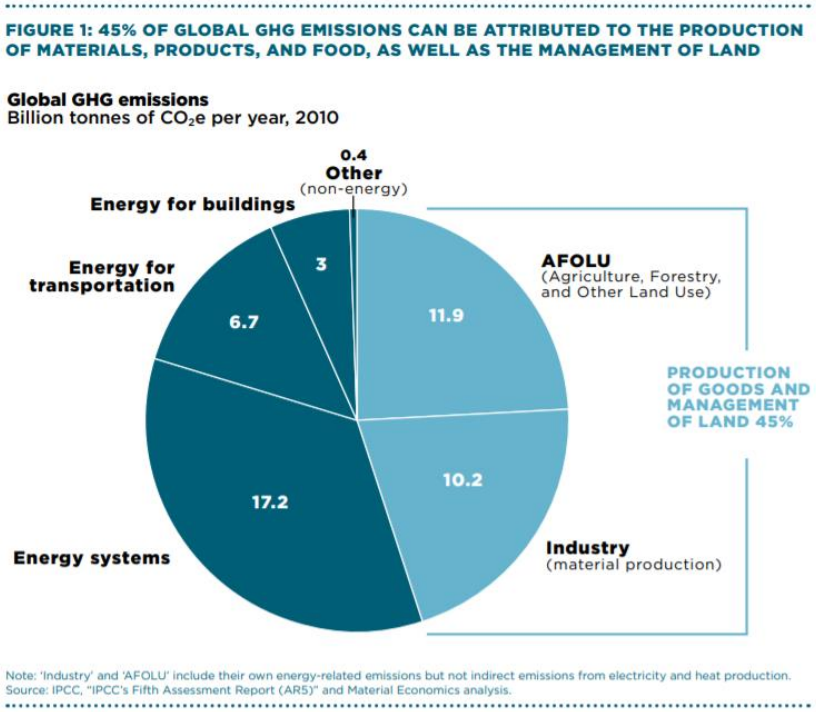
"Overall, the extraction and processing of natural resources account for more than 90 per cent of global biodiversity loss and water stress impacts and for approximately half of global greenhouse gas emissions."

Recommended citation: IRP (2019). Global Resources Outlook 2019: Natural Resources for the Future We Want. Oberle, B., Bringezu, S., Hatfield-Dodds, S., Hellweg, S., Schandl, H., Clement, J., and Cabernard, L., Che, N., Chen, D., Droz-Georget , H., Ekins, P., Fischer-Kowalski, M., Flörke, M., Frank, S., Froemelt , A., Geschke, A., Haupt , M., Havlik, P., Hüfner, R., Lenzen, M., Lieber, M., Liu,B., Lu, Y., Lutter, S., Mehr , J., Miatto, A., Newth, D., Oberschelp , C., Obersteiner, M., Pfister, S., Piccoli, E., Schaldach, R., Schüngel, J.,Sonderegger, T., Sudheshwar, A., Tanikawa, H., van der Voet, E., Walker, C., West, J., Wang, Z., Zhu, B. A Report of the International Resource Panel. United Nations Environment Programme. Nairobi, Kenya.

HOW WE HANDLE PHOSPHORUS AND NITROGEN AFFECT THE SOCIETY



Credit: J. Lokrantz/Azote based on Steffen et al. 2015



Credit: Ellen McArthur Foundation – Completing the picture: How the circular economy tackles climate change, September 2019

GUIDING PRINCIPLES FOR RAGN-SELLS' INVESTMENT IN CIRCULAR SOLUTIONS

When developing sustainable solutions for a circular society these three principles need to be considered.

PATENTED PROCESSES

EasyMining commercializes patented chemical processes

ASH2PHOS

Phosphorus extraction from sewage sludge ash

ASH2SALT

Salt extraction from fly ash

CLEANMAP

Energy efficient production of ammonium phosphate

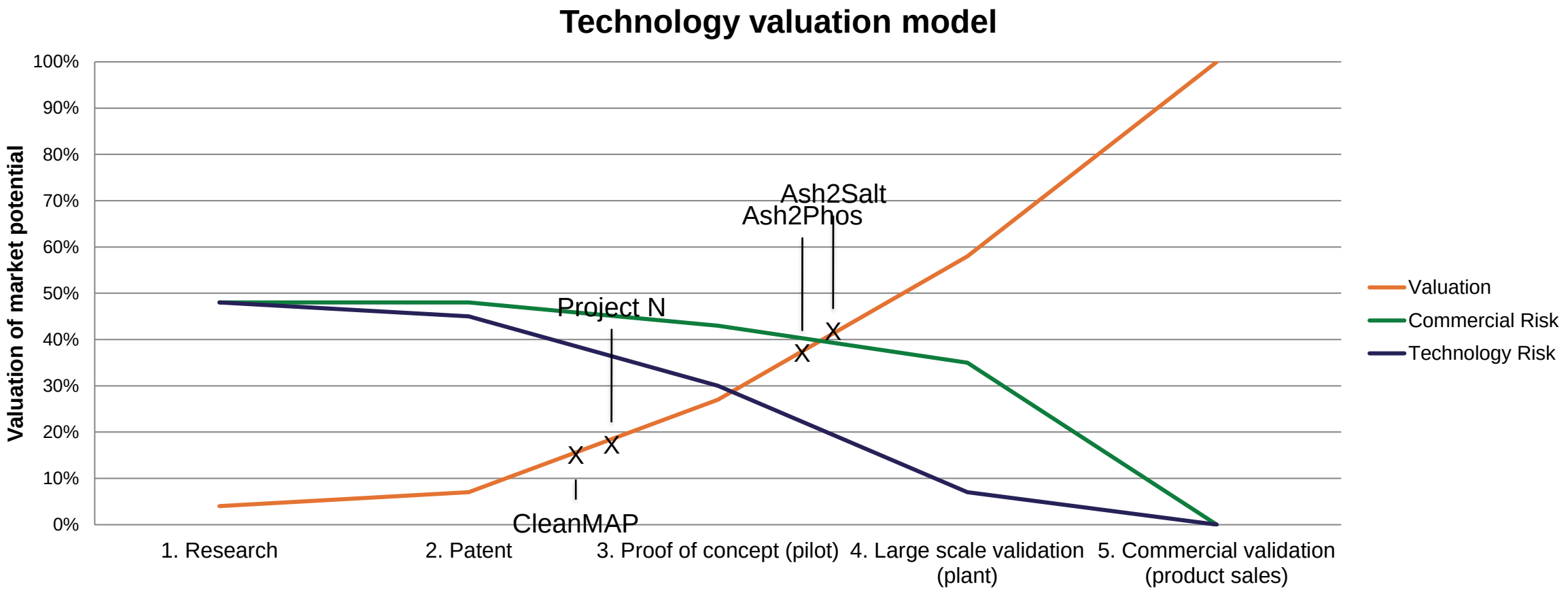
PROJECT NITROGEN

Recovery of nitrogen from liquid waste streams

EasyMining

4. Large scale validation = first plant
5. Commercial validation = second plant contracted + established product sales

STAGE PER PROJECT

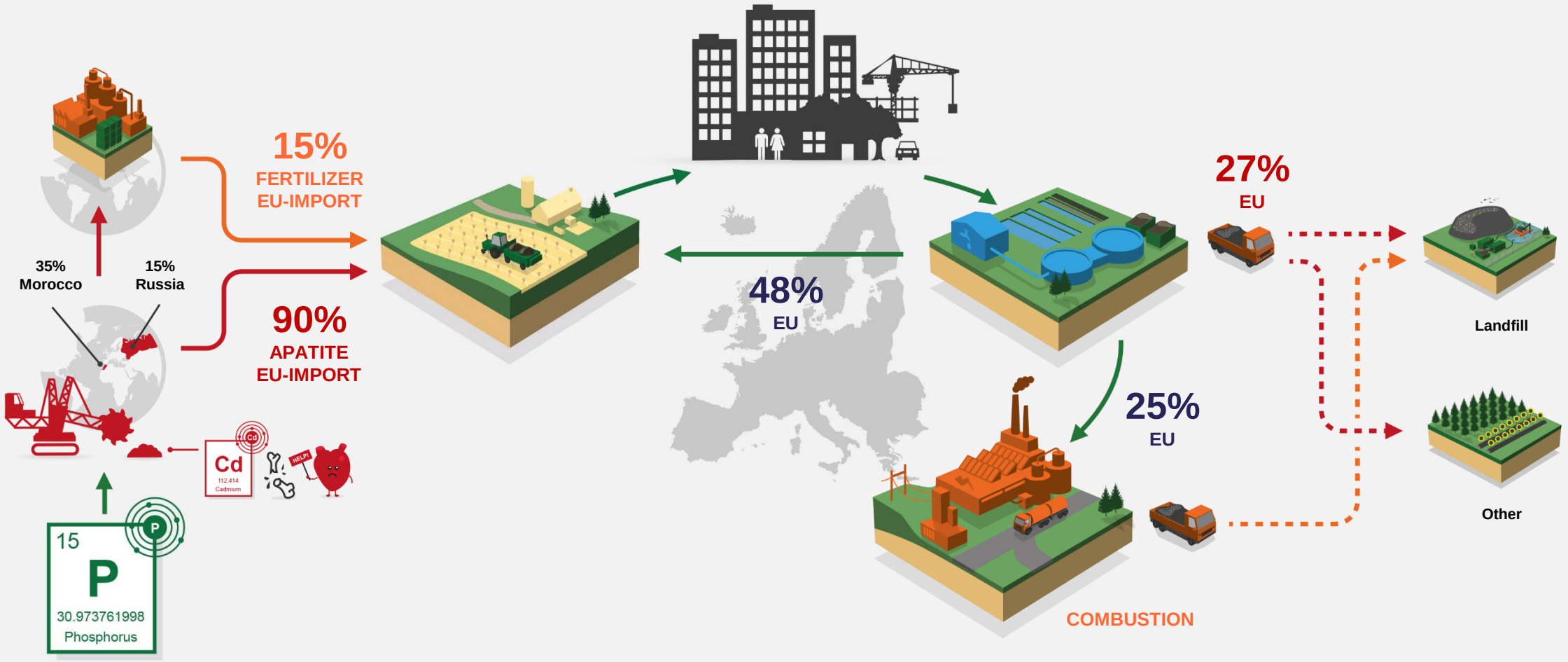


Ash2©Phos

From sewage sludge to clean phosphorus products

INNOVATIVE
TECHNOLOGY
FOR A SUSTAINABLE
DEVELOPMENT

ragnsells.com

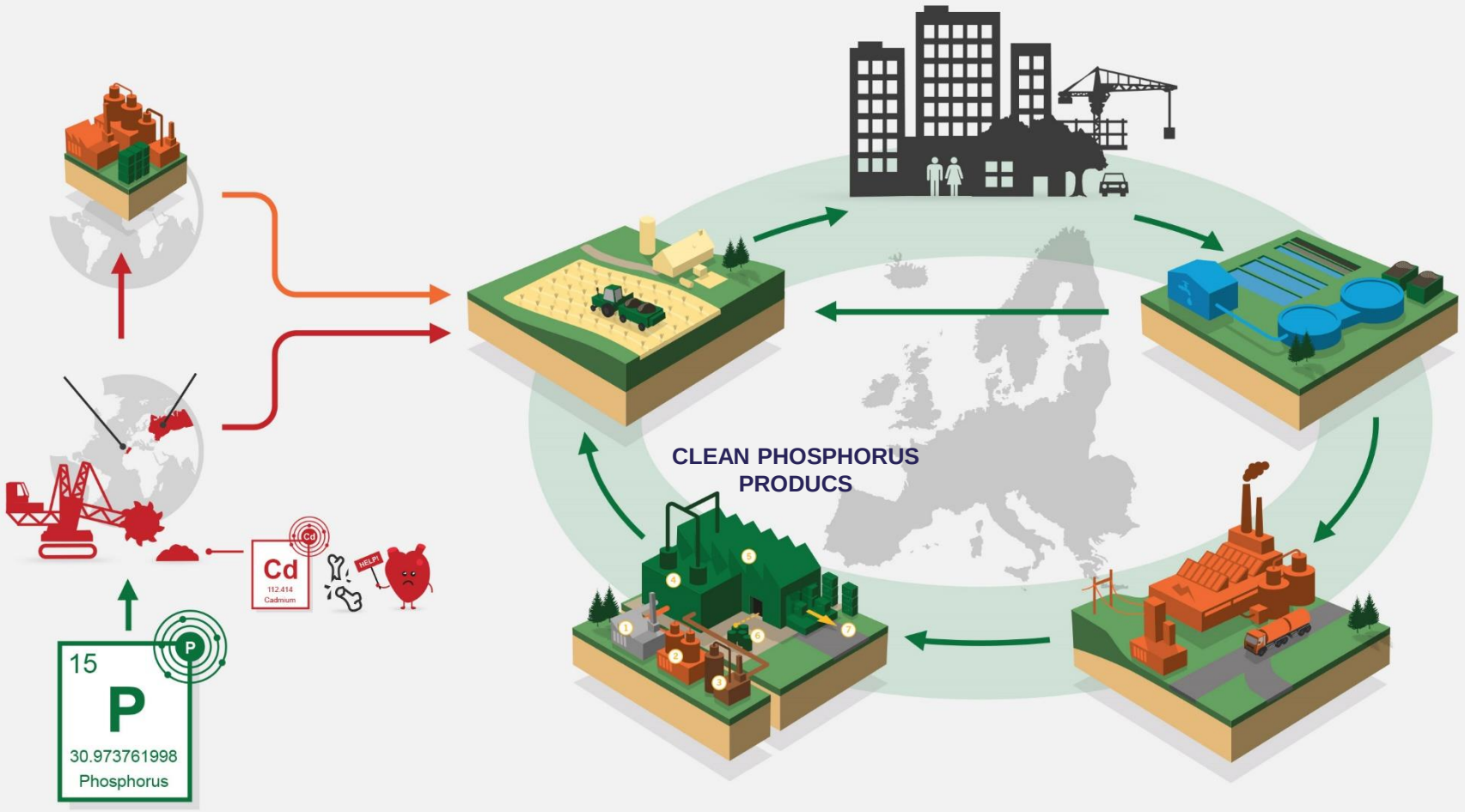


PHOSPHORUS CYCLE IN EUROPE

Challenge with todays import of Phosphorus.

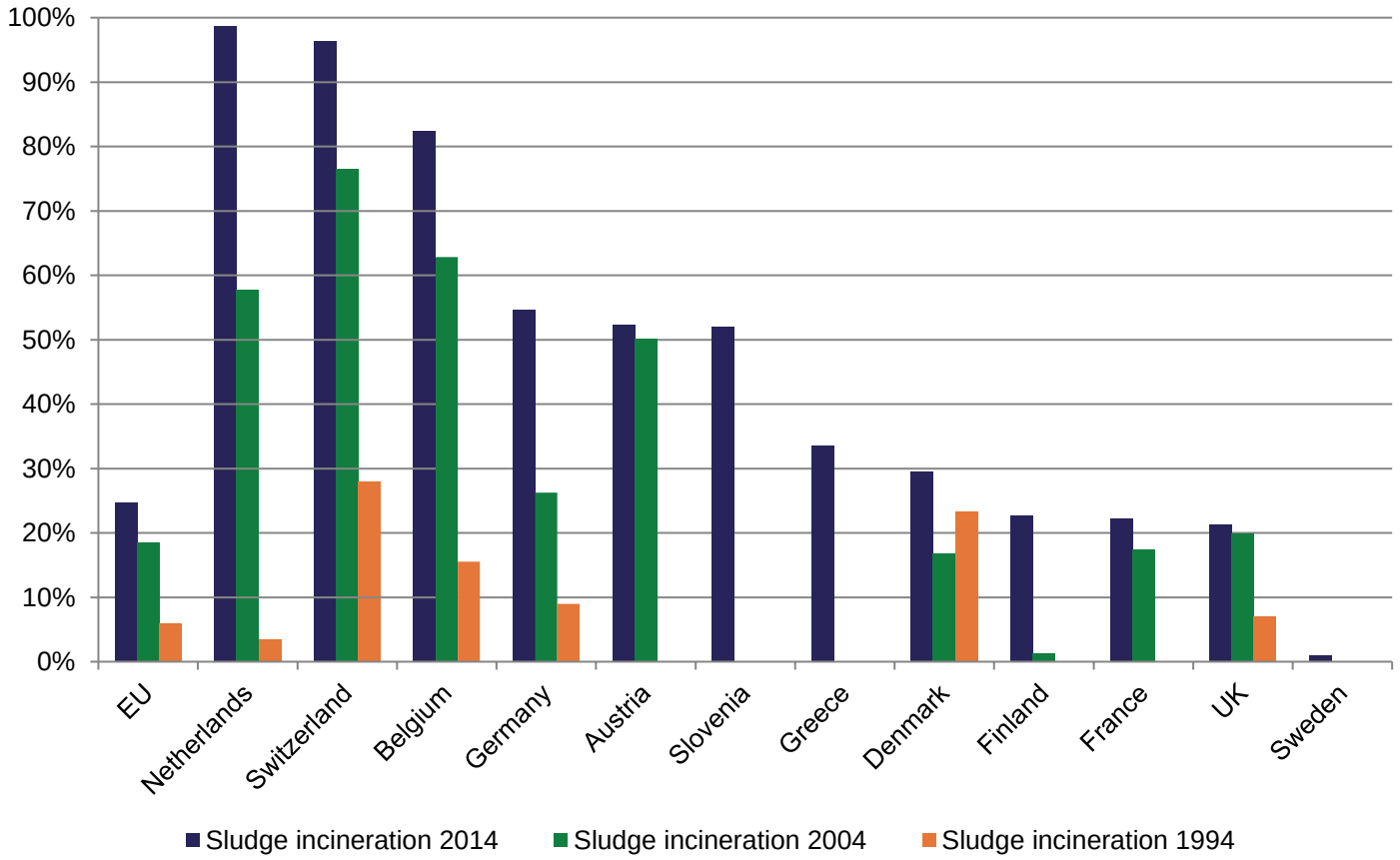
EasyMining

OUR AMBITIONS



EasyMining

SLUDGE ASH - COUNTRIES SHARE OF SLUDGE COMBUSTION 1994 - 2014



EasyMining

MANDATORY PHOSPHORUS RECOVERY

German sludge and P-recovery ordinance moves forward

On 18th January, the new German new sewage sludge ordinance (AbfKlärV), which will make phosphorus recovery obligatory for most of Germany's sewage, was validated by the German Cabinet (see ESPP eNews n°6). It is now expected to pass the parliament and Federal Council before summer 2017 and enter into force in January 2018, making phosphorus recovery obligatory for larger sewage works within 12 years (> 100 000 p.e.) or 15 years (> 50 000 p.e.), under certain conditions. P-recovery will thus be required for around 500 sewage works (out of a total of 9 300 in Germany), treating around 2/3 of German sewage. At present, around 26% of German sewage sludge is spread on arable

Switzerland banned direct use of sewage sludge on land in 2006, so the regulation will

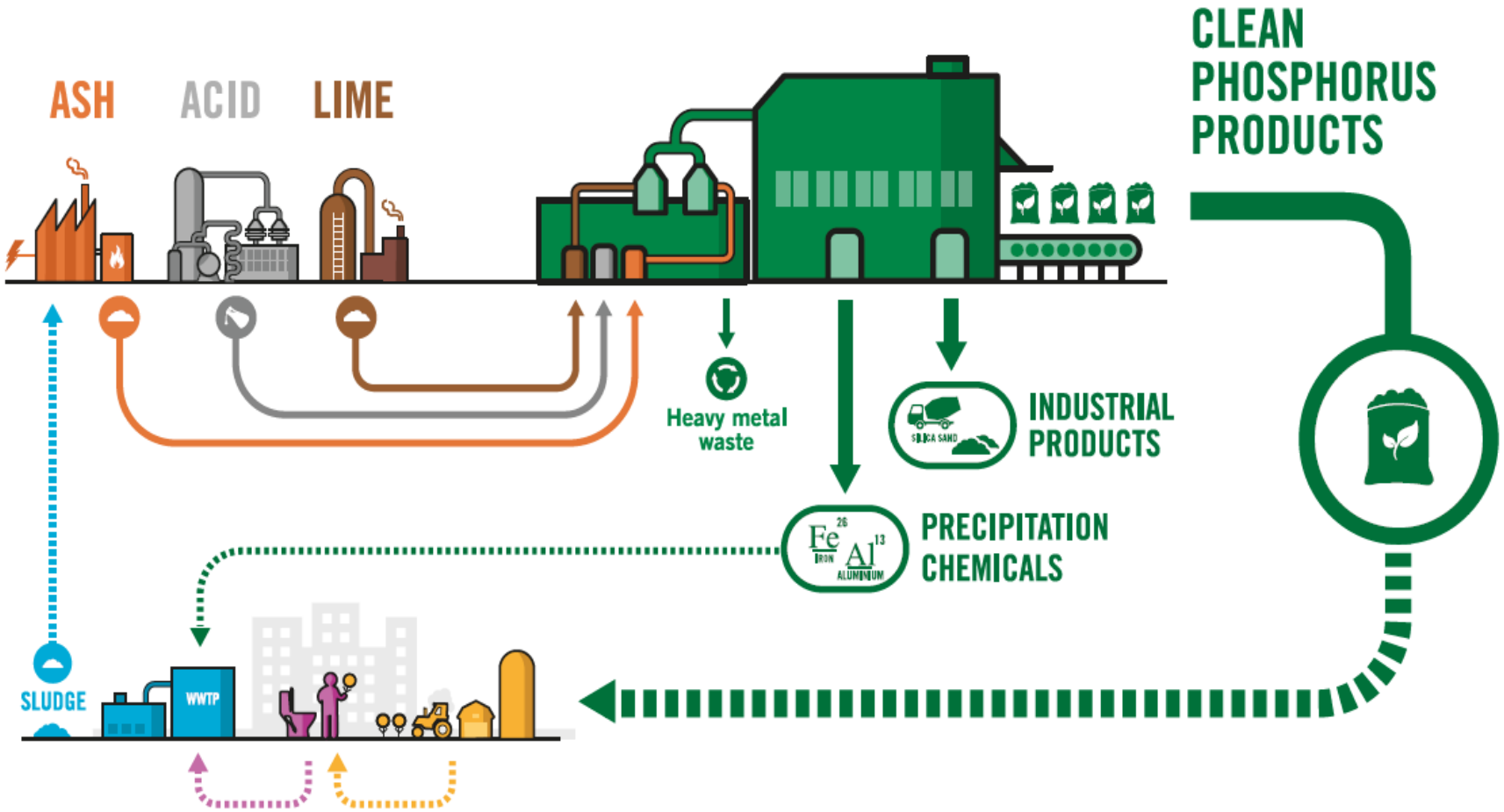
Since the first of January phosphorus recovery and recycling from sewage sludge and slaughterhouse waste is obligatory in Switzerland. The new regulation is introduced with a transition period of ten years. Switzerland claims to be globally the first country to oblige resource recovery.

Austria opts for manadatory phosphorus recovery from sewage sludge

Following the legislative developments in Switzerland and Germany, Austria is now also opting for madatory P recovery from municipal sewage sludge.

Switzerland is the first country making phosphorus recovery from sludge and meat and bone-meal obligatory and Germany is set to follow in passing legislation. The necessary investment volume for the Swiss transition has been estimated in the range between 100 and 400 MEUR the next ten years.

ASH2PHOS



EasyMining

ASH2PHOS – PROCESS PERFORMANCE

SLUDGE ASH

Ash2Phos typical recovery

Phosphorus	Aluminium	Iron	Calcium
≈ 90-95%	≈ 60-80%	≈ 10-20%	≈ 80-90%

ASH2PHOS – DETOXIFIES CIRCULAR FLOWS

		Recovered P	Ash	% Reduction
As	mg/kg	1,5	34,6	96
Cd	mg/kg	0,1	5,5	98
Co	mg/kg	0,7	32,4	98
Cr	mg/kg	1,7	232	99
Cu	mg/kg	5,5	1756	100
Fe	mg/kg	1340	202826	99
Hg	mg/kg	-	0,0526	100
Pb	mg/kg	3,6	344	99
Zn	mg/kg	45,9	6780	99
Ni	mg/kg	2,6	164,6	98

More than 96% reduction in heavy metals!

ASH2PHOS – PRODUCTS FROM THE PROCESS

Ash2Phos results in clean, well known products where the input chemicals become part of the final product. Products are effective in their applications.

Products from the process >95% can be used

- Phosphorus
  - Precipitated Calcium Phosphate (PCP)
  - Converted PCP: MAP, SSP, DCP, MCP
- Precipitation chemicals
  - Iron Chloride
  - Aluminium product
- Silica sand
- Heavy metal

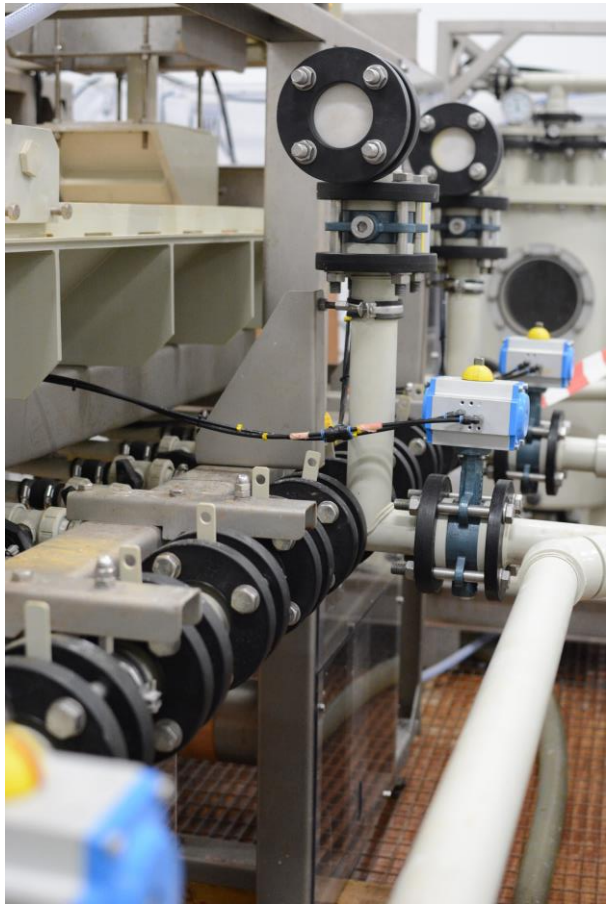
RECOVERED PHOSPHORUS PRODUCT

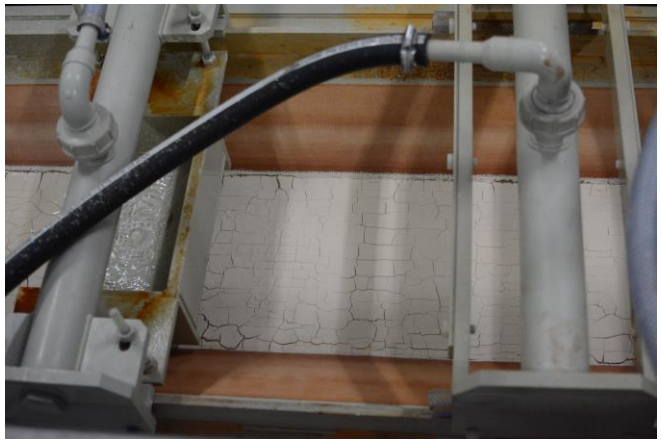
SILICATE SAND AS CEMENT REPLACEMENT IN CONCRETE

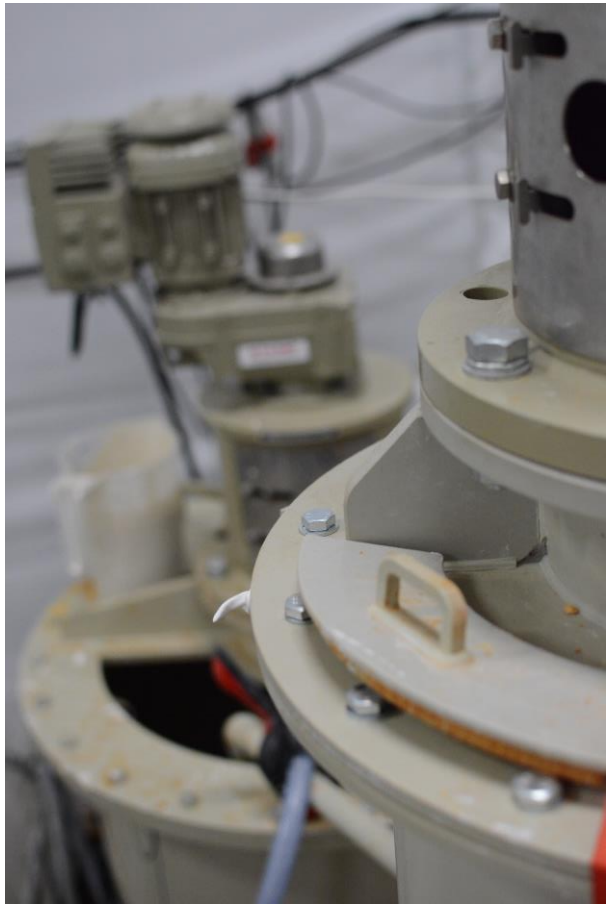
Webinar 2/10: Value adding recycling sewage sludge in concrete

EasyMining

PILOT RUNS







PARTNERSHIP WITH GELSENWASSER FOR ROLL OUT OF ASH2PHOS IN GERMANY

GELSENWASSER

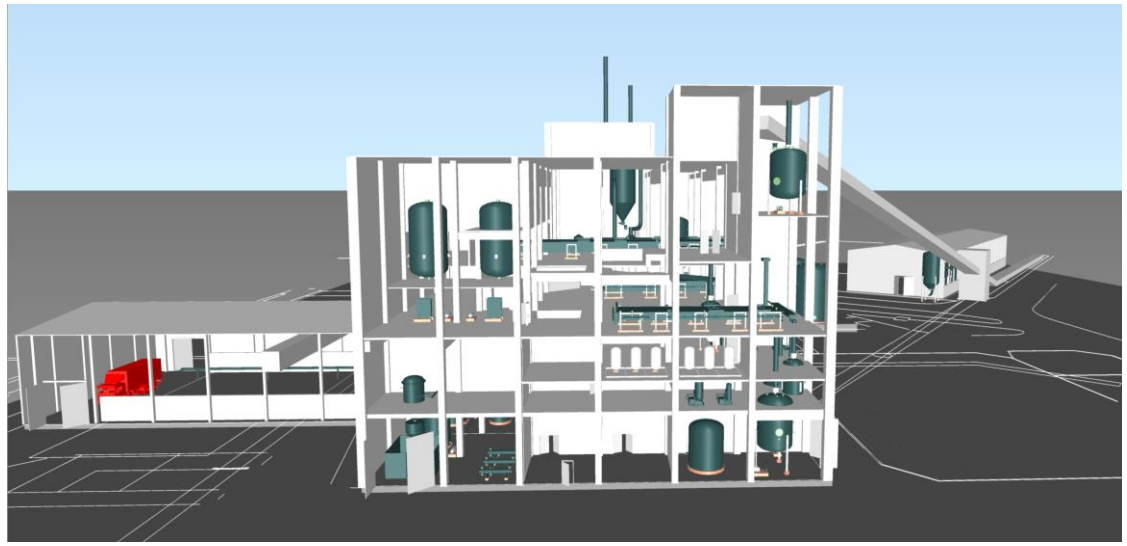
Important partnership to recover phosphorus from sewage sludge ash

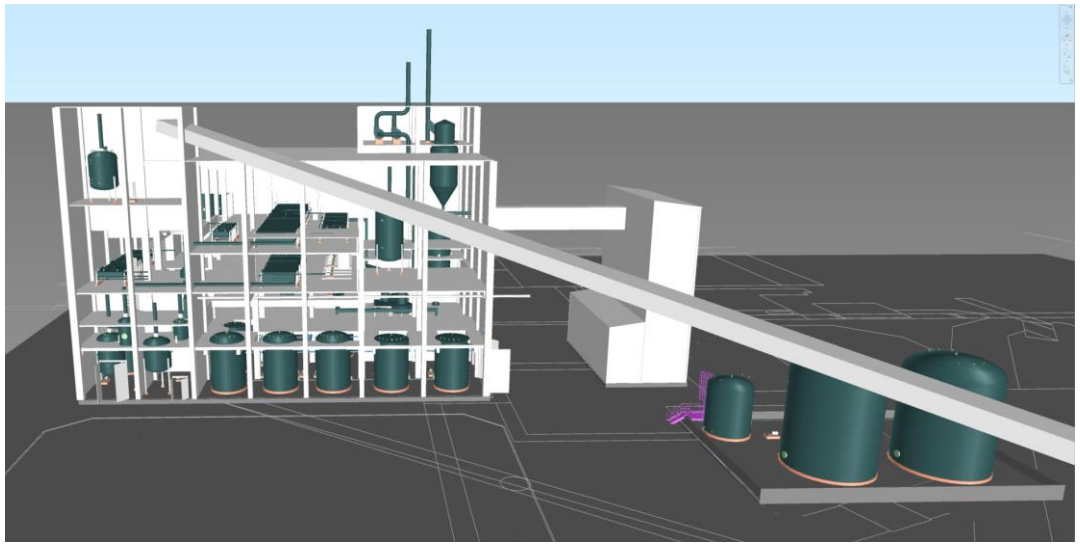
- It is very important that the technical solution chosen is sustainable both from an **energy efficiency perspective**, **economically** and in regard to the **chemicals** necessary for the process. Above all, the recovered phosphorus must be of a **high enough quality** that meets the needs of the market. EasyMining and their solution delivers on all these aspects, says Henning R. Deters, CEO of GELSENWASSER AG.

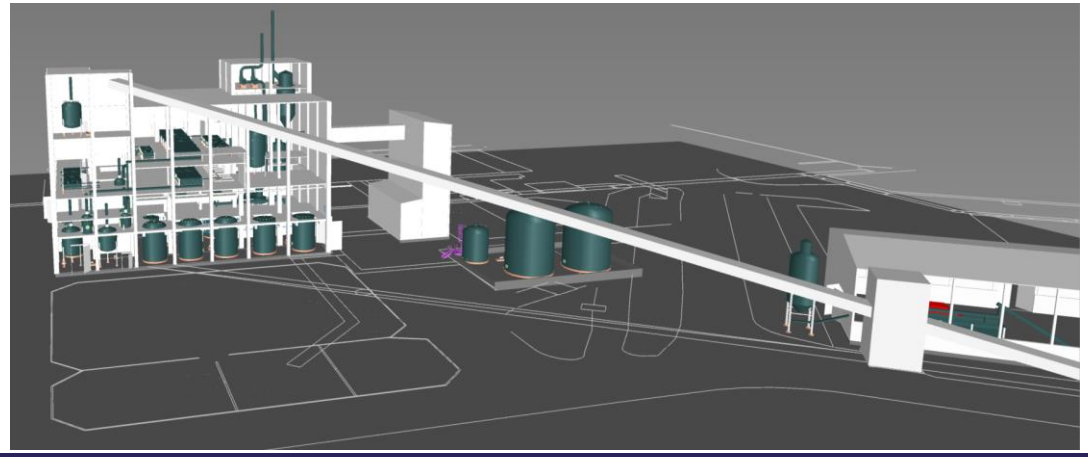
ASH2PHOS SITE IN HELSINGBORG

EasyMining

ASH2PHOS PLANT



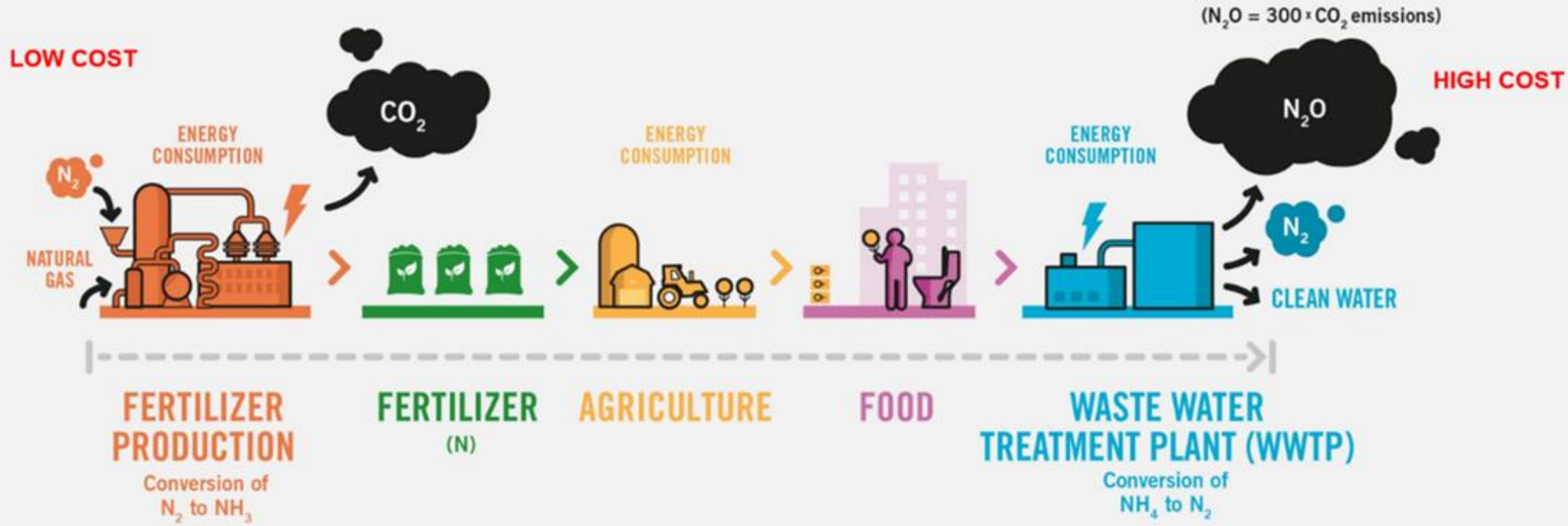




RAGN-SELLS AND BIOFOS ENTER PARTNERSHIP ON P-RECOVERY


Project Nitrogen / RE-Fertilize
From ammonium (NH_4)
to climate neutral fertilizers
INNOVATIVE
TECHNOLOGY
FOR A SUSTAINABLE
DEVELOPMENT
ragnsells.com

EasyMining



TODAY'S NITROGEN FLOW

- Large greenhouse gas emissions
- Eutrophication
- Removed nitrogen is released to the atmosphere

PROJECT N – A CIRCULAR NITROGEN SOLUTION

- A new innovative chemical process for removal of ammonium nitrogen from wastewater and other liquids with high ammonia concentration

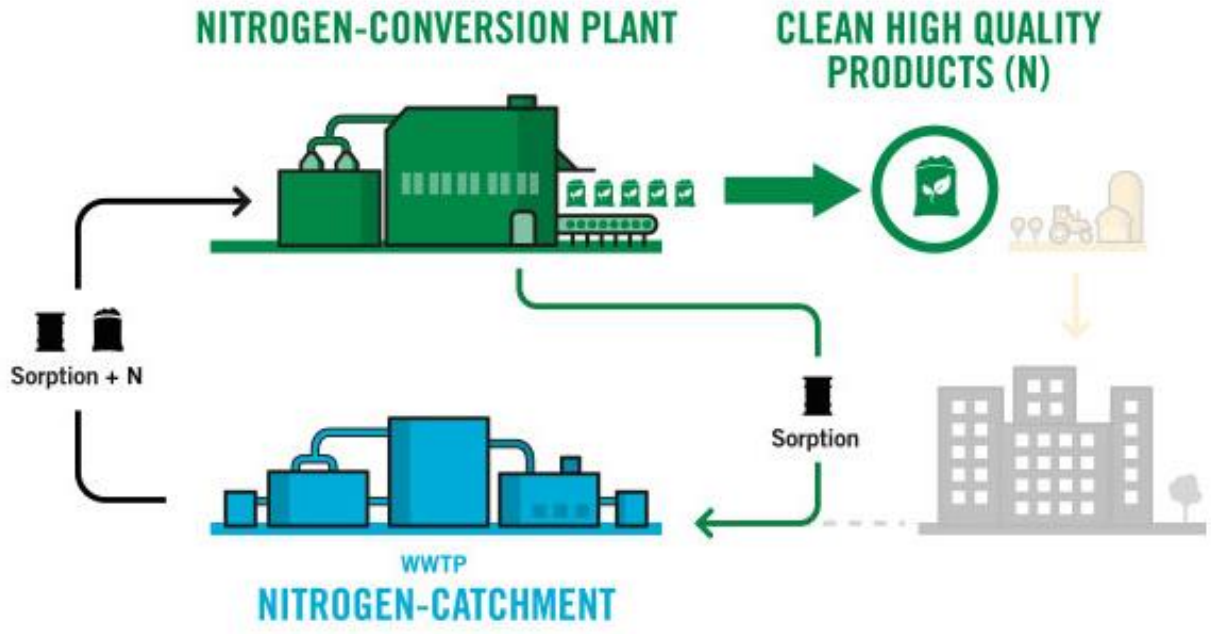
- Value adding by:
  - Prevention of eutrophication
  - Circular solution
  - Energy and resource efficiency
  - Greenhouse gas reduction
  - Cost efficient

- Technology customer segments in focus:
  - Wastewater treatment plants (reject water)
  - Landfills (leachate)

  But other areas of application is possible as we see it

NITROGEN REMOVAL AND RECYCLING

- Applicable on water streams with a high concentration of ammonium nitrogen
  - Removes ammonium nitrogen down to 10 mg/l
- Converts the captured nitrogen to either ammonium sulphate, ammonium nitrate, ammonium phosphate or ammonium chloride depending on acid used
- Sorption chemical is regenerated and circulated in the process
- Two step process
  - Possible to have catchment plant locally and conversion plant centrally (depending on feasibility)



PROS WITH OUR PROCESS

- Chemical process – stable and robust
- Highly effective in removal of ammonium nitrogen
- Low energy consumption
- No releases of greenhouse gases
- Circular solution – gives a product usable in e.g. fertilizers

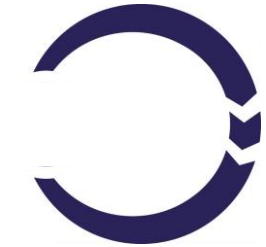
LCA will be updated spring 2022 after finished demonstration runs

RE-FERTILIZE – AN EU LIFE PROJECT

- Project goal
  - The overall goal of the project is to demonstrate a new, innovative cleaning and recovery process for ammonia/nitrogen, which can be used for several different ammonia products (e.g. fertilizers).
- Implementation
  - The demonstration will take part for two applications, landfill leachate water and reject water from sludge de-watering at WWTP, using **mobile units** for the N-catchment and N-conversion
- Project partners
  - Easymining (co-ordinator)
  - Ragn-Sells, Högbytorp (application landfill leachate)
  - Biofos A/S in Copenhagen (application reject water, WWTP)
  - Lantmännen (evaluation of fertilizer product)
- Project started 1/7 2019 and end 30/6 2022
- Budget, total 3,6 M€, EU contribution 1,86 M€

This project **RE-Fertilize**, has received funding from the EU-LIFE fund under agreement LIFE18 ENV/SE/000265

TIME PLAN (EU LIFE RE-FERTILIZE)



Q4

- Basic engineering finished

Q1

- Detail engineering started

Q2

- Detail engineering finished
- Fabrication demonstration plant started

Q3

- Fabrication demonstration plant finished

Q4

- Demonstration runs landfill

Q1

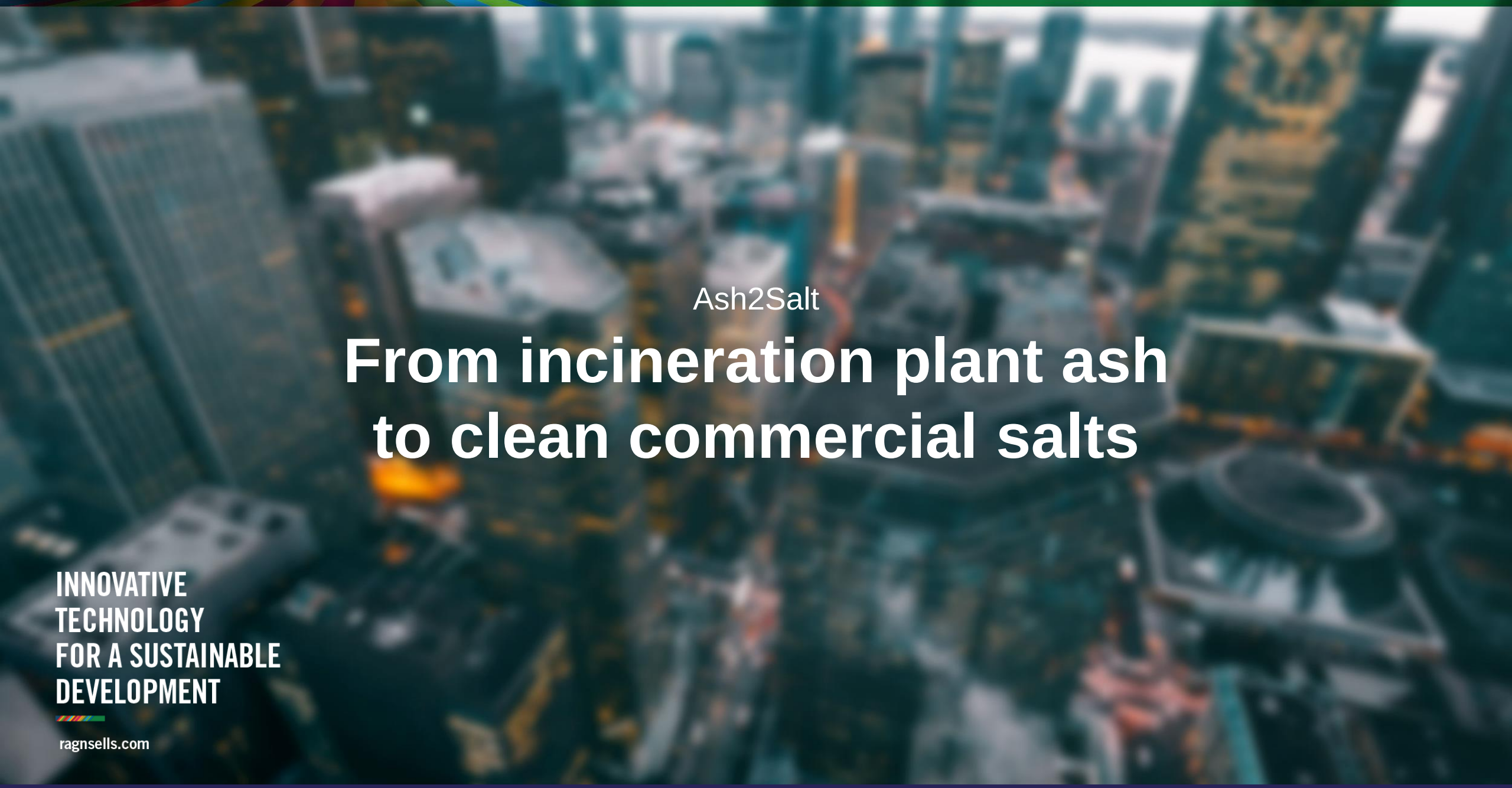
- Demonstration runs landfill cont.
- Demonstration runs WWTP

Q2

- Demonstration runs WWTP cont.
- Evaluation nitrogen product
- LCA updated

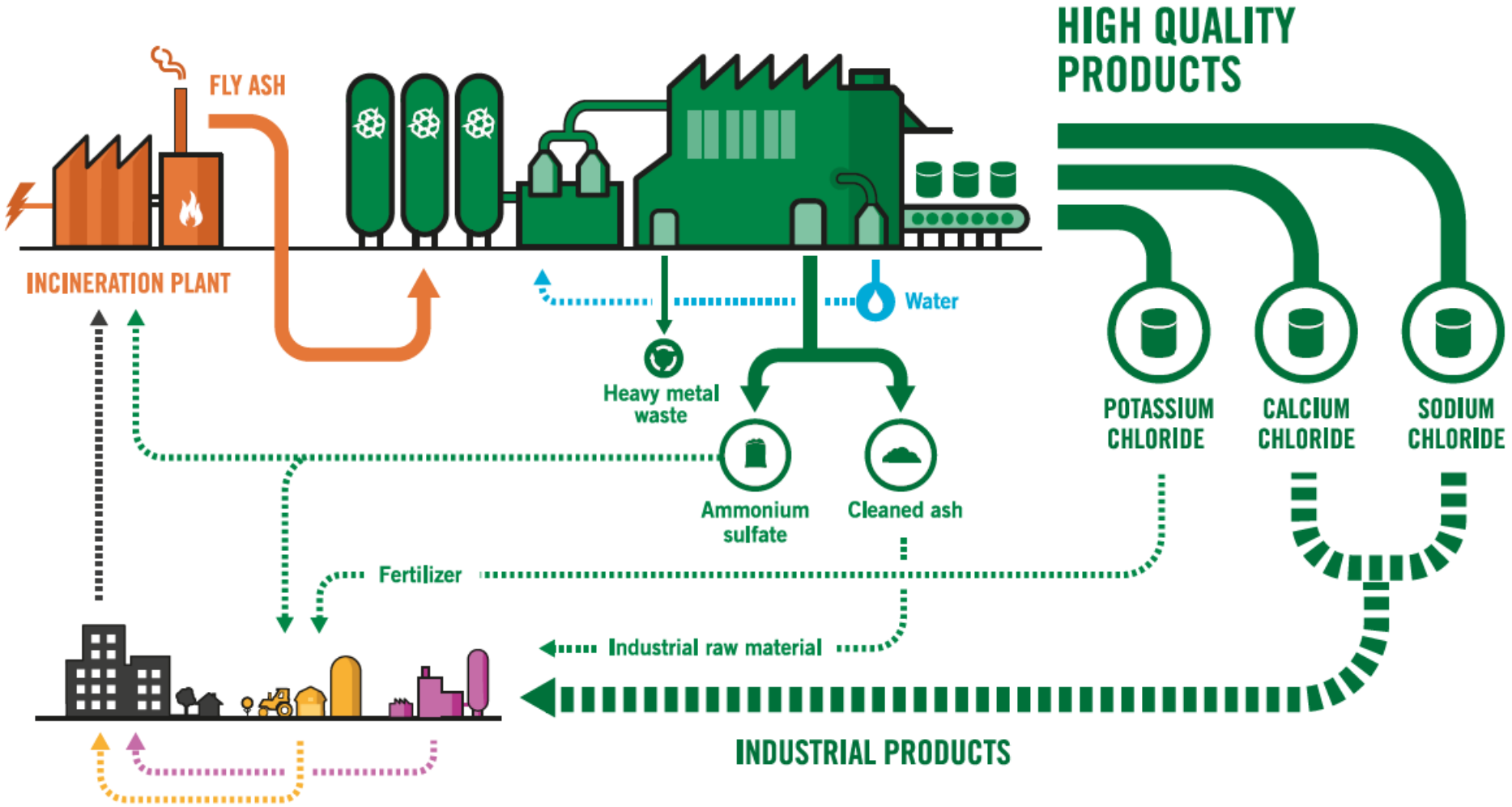
Q3

- Evaluation and reporting
- EU LIFE RE-Fertilize ends


Ash2Salt
From incineration plant ash to clean commercial salts
INNOVATIVE TECHNOLOGY FOR A SUSTAINABLE DEVELOPMENT
ragnsells.com

BACKGROUND
FLY ASH

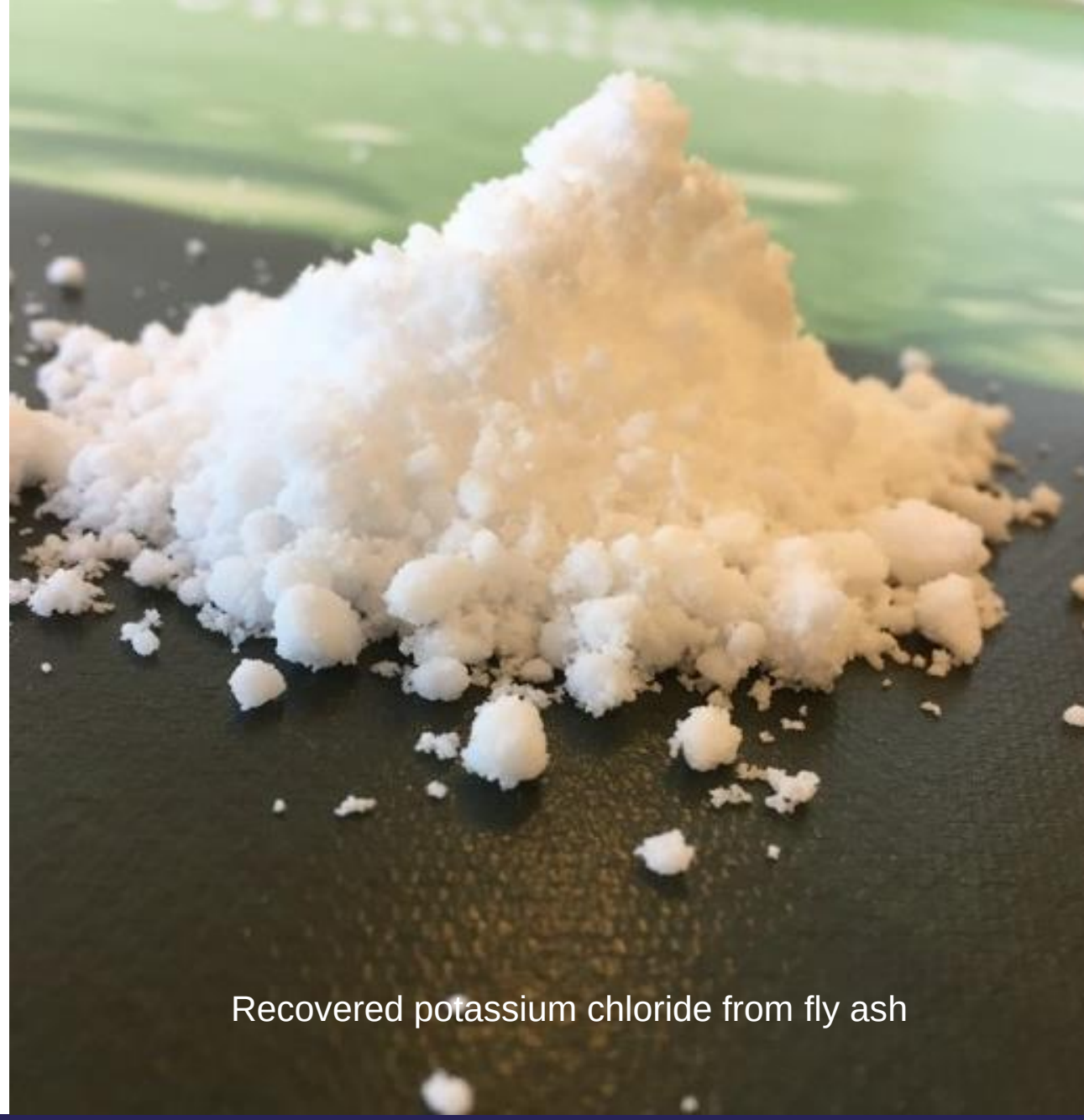
- Fly ash is a waste product from cleaning of flue gases in incineration plants.
- Fly ash from waste incineration is classified as hazardous waste due to a high content of salts (>20%) and heavy metals.
- 300 000 tons of fly ash is the annual production generated from waste incineration in Sweden.


HIGH QUALITY PRODUCTS
FLY ASH
INCINERATION PLANT
Water
Heavy metal waste
POTASSIUM CHLORIDE
CALCIUM CHLORIDE
SODIUM CHLORIDE
Ammonium sulfate
Cleaned ash
Fertilizer
Industrial raw material
INDUSTRIAL PRODUCTS

ASH2SALT – PRODUCTS FROM THE PROCESS

- Potassium chloride – 3 500 ton (dry)
- Sodium chloride – 7 000 ton (dry)
- Calcium chloride – 32 000 ton (36%)

Potassium chloride and sodium chloride are of technical/industrial quality (>99% purity)



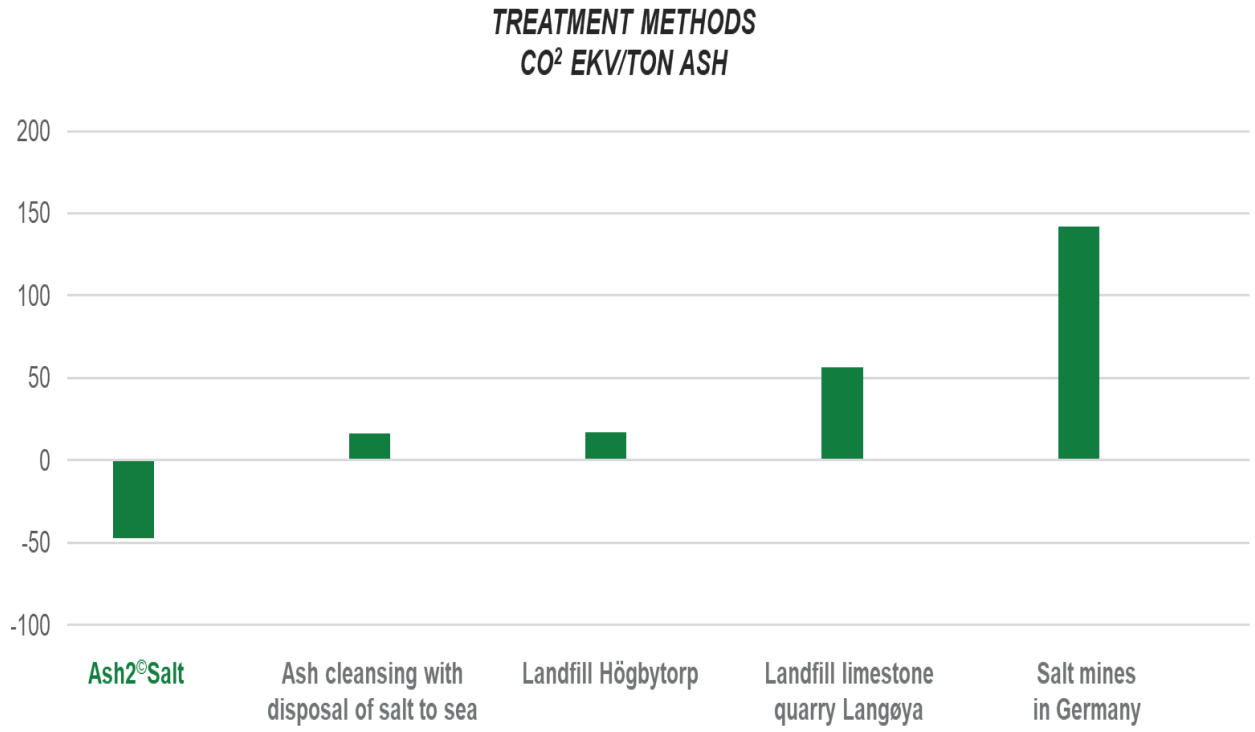
Recovered potassium chloride from fly ash

ASH2SALT – DETOXIFICATION AND ENERGY EFFICIENCY

ANALYSIS OF POTASSIUM CHLORIDE

Al	ppm	<10
Fe	ppm	5,4
Co	ppm	<5
Ni	ppm	<5
Cu	ppm	<5
As	ppm	<5
Se	ppm	<5
Mo	ppm	<5
Cd	ppm	<5
Sb	ppm	<5
Ba	ppm	<5
Ti	ppm	<5
Pb	ppm	<5
V	ppm	<5
TOC	%	<5
Particle size	mm	0,25-0,4

Recovered potassium chloride of 99,1% purity!



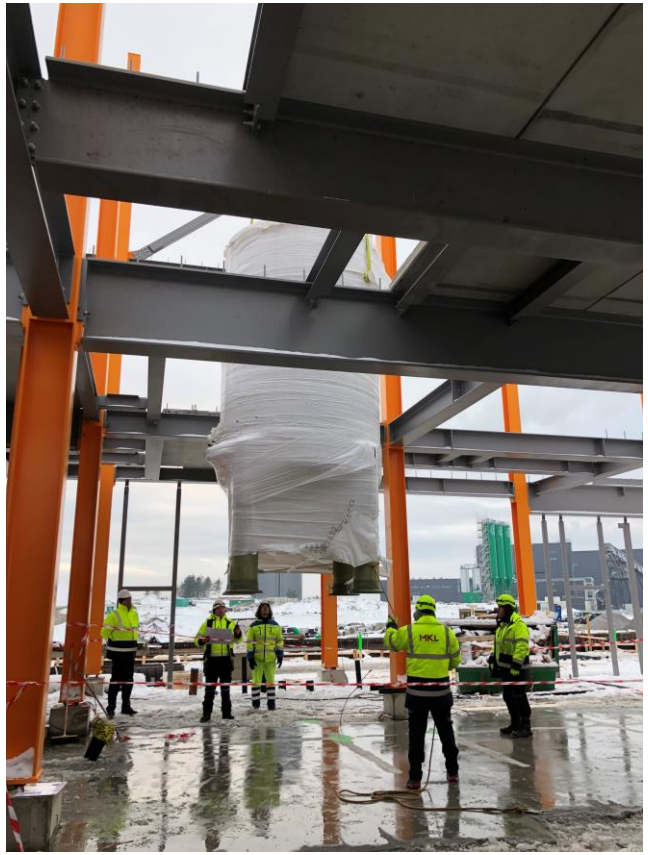
EasyMining

FIRST PLANT UNDER CONSTRUCTION

- Estimated start of production 2022
- Capacity of 130 000 ton/year
- Built at Ragn-Sells Högbytorp outside Stockholm, Sweden

EasyMining

STATUS ASH2SALT PLANT HÖGBYTORP JANUARY 2021



- According to plan
- First level of steel pillar (15 m) and cross beams in place
- Prefabricated system of joints for level at 5 m has started to be lift in place

CHALLENGES AND HINDRANCES

CHALLENGES AND HINDRANCES

- Virgin material not bearing all costs
- Legislative hindrances
- End of Waste

LEGISLATION FOCUS IS ON ORIGIN NOT QUALITY

Clean Commercial Products

MARKETS		REGULATION(S)
Conventional farming	X	2003/2003 2019/1009
Organic farming	X	2018/848 889/2008
Animal nutrition	X	767/2009

EasyMining

ACTIONS

Clean Commercial Products

- **Conventional farming**
- **Organic farming**
- **Animal nutrition**

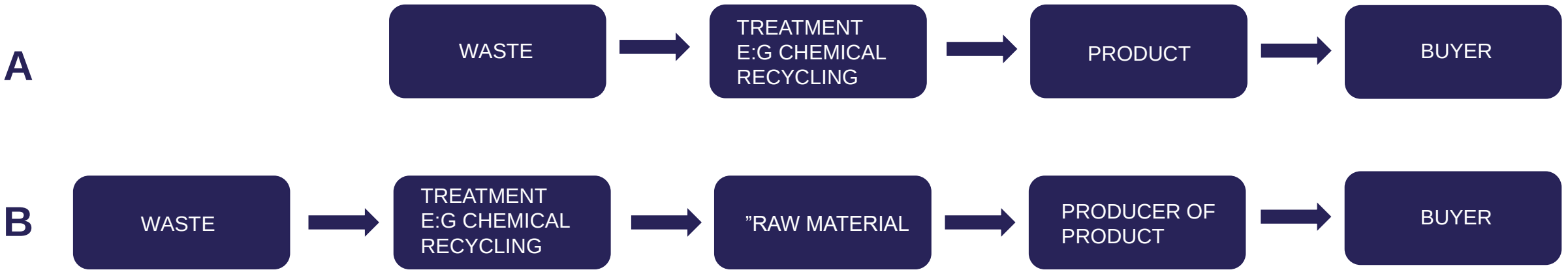
AGRNONOMIC TESTS

LEGISLATIVE LOBBYING

FEED TESTS

EasyMining

GENERAL LEGISLATIVE HINDRANCE: EOW



GENERAL LEGISLATIVE HINDRANCE: END OF WASTE

BACKGROUND

- End of Waste is crucial in a circular economy
- The interface between waste and chemicals legislation still missing a smooth path linked to the EoW process

HINDRANCE

- **In case A**: RS/EM produce a product ready to sell to the market
  - EoW criteria often missing (both internationally and nationally)
  - EoW needs to be solved case by case; time consuming and responsible agencies missing experience

- **In case B**: RS/EM produce an intermediate raw material for someone else that “blends in” this material to a final product
  - The producer of the final product needs permit for handling waste and needs to do the EoW process
  - It is extremely time consuming a hard to get waste permits generally.

GENERAL LEGISLATIVE HINDRANCE: END OF WASTE

WHAT NEEDS TO BE SOLVED

- Intermediate recused raw materials needs to be acknowledged in a circular legislation
  - No waste permits needed
  - Should not only be waste or chemicals in the legislation
- More International EoW criteria
- National EoW criteria (Sweden has none)
- Better guidance and support for reused products and raw materials: EoW going case by case

HOW WE WORK WITH THE HINDRANCES

Time to make linear laws circular

Many of the obstacles we encounter in our work to return nutrients to the society are regulated at EU level. Together with our owners, Ragn-Sells, and Maria Wetterstrand, CEO of Miltton Europe, we will do what we can, on site in Brussels, to change this.

The side session "A circular economy to help the planet heal" was hosted by Pär Larshans, Sustainability Director at Ragn-Sells, and Anna Lundbom, Head of Marketing at EasyMining.

Welcome to Eat@home live broadcast

EasyMining has developed solutions for detoxifying and recirculating both phosphorus and nitrogen with a low carbon footprint. The challenge is that these recycled products cannot be used with current EU-legislation. On that topic, EasyMining together with Ragn-Sells, hosted a side session at EAT's digital event EAT@Home on the 17th of December.

We need a new circular legislation for sustainable sludge handling

MILJÖMÅLSBEREDNINGS ”HAVET OCH MÄNNISKAN” – POSITIVT!!

Återvunnen fosfor och kväve

För att minska övergödningen av havet måste vi styra mot cirkulära flöden av fosfor och kväve, öka återföringen av och effektiviteten vid användningen av växtnäringsämnen samt stärka åtgärdsarbetet för att minimera tillförsel av fosfor och kväve till vatten och hav. Vi föreslår därför bland annat ett etappmål om att öka återföringen av fosfor och kväve från stallgödsel, avlopp och matavfall till livsmedelsproduktion. Men även att regeringen ska verka inom EU för en kvotplikt på inblandning av en minsta mängd återvunnen fosfor och kväve i mineralgödsel.

EasyMining

EXAMPLES OF CONTECT ON OUR WEBSITE - WWW.EASYMINING.SE

COMPANY NEWS

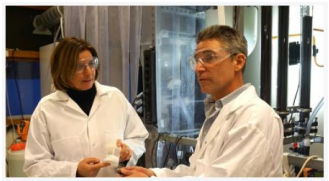
Ash2Phos will be implemented in Germany

We increase interest in chemistry among youths

EasyMining's innovations are promoting the circular economy

HOW WE WORK

We are recycling nitrogen from waste water



Isabella Lövin visited our pilot project

A ”mistake” in the lab laid the foundation for EasyMining

MEET OUR TEAM

Ida is upscaling our innovations

Jan Åke Jonsson new Chairman of EasyMining

Christian is important for German phosphorus recovery

FACTS & FIGURE

What is fly ash and why is it important to care about?

What is phosphorus and why is it important to care about?

Ash2Phos – pioneering patent for vital nutrient


EasyMining