



STIFTUNG ZENTRUM FÜR NACHHALTIGE
ABFALL- UND RESSOURCENNUTZUNG

Foundation centre for sustainable waste and resource management



2025

Activity Report / Annual Report

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Foreword by the President

When we launched the Foundation Centre for Sustainable Waste and Resource Management (ZAR) in January 2010, it did not spring from a dream but from a vision. Dreams, by their nature, evaporate when we wake in the morning. Bringing a vision to life requires a clear mind and a great deal of stamina, so that it can be translated into concrete measures.

The Building Department of the Canton of Zurich, the Association of Swiss Waste Treatment Plant Operators (VBSA) and the Association of Waste Disposal for the Zurich Oberland, Hinwil supported this vision as founders when the Foundation was established in 2010.

On 4 July 2025, representatives of the ZAR Foundation once again presented to a broad audience, at a specialist conference, what the Foundation had developed and implemented in recent years. The fact that speakers from outside the ZAR Foundation also delivered valuable input papers at this conference shows that we have always been aware that success can only be achieved through good networking with practice, politics, administration and science.

The success of the circular economy undoubtedly begins with supply chains and the intelligent use of raw materials. It is further shaped by product longevity and low energy demand during use. Given the lifestyle that societies have adopted over recent decades through the use of fossil energy and the associated growing prosperity, zero waste remains a dream.

All the more important, then, are visions and concrete measures showing how high-quality raw materials in demand on the market can be recovered from waste that is not directly recyclable. In addition, the opportunity must be seized to destroy pollutants or dispose of them safely so that they do not re-enter the cycle.

Over the past 15 years, the ZAR Foundation has intensively pursued the development of practical solutions for recovering metals from residues of thermal waste treatment, solutions that have also been implemented by ZAV Recycling AG (bottom ash) and kenova AG (fly ash). The resulting state of the art invites emulation.

The ZAR Foundation has also been strongly involved in developing processes for recovering phosphorus from sewage sludge ash and for capturing CO₂ from the flue gases of thermal waste treatment.

Because the implementation of technical achievements for the benefit of the environment or the circular economy is currently often only undertaken when there is a clear legal mandate to do so, we have also engaged in this policy field.

Alongside “knowing how” and the legal requirements of “what should be done”, it is ultimately often money – or rather the thought of “why should we invest, if others do not do so either” – that causes the implementation of circular-economy measures to be delayed.

With the “online” ordering of goods and the purchase of products in department stores, our understanding of the concept of the “commons” – collectively used resources – has been lost. Goods such as water, air and soil must also be cared for and preserved jointly, so that they can be used by everyone in the long term.

Many people know that one of my favourite images has been – and still is – the “Fountain of Youth”.

This image makes sense on several levels:

- ▶ Valuable materials from waste can be returned to the cycle, and
- ▶ the chairmanship and management of the ZAR Foundation will be handed over to younger hands from 2026.

I would like to take this opportunity to thank our long-standing donors for their loyal support and our project partners for their openness in our collaboration. My thanks also go to the staff who have worked tirelessly, year after year, for the ZAR Foundation, ensuring that our visions do not remain on paper, and to my colleagues on the Board of Trustees and the Technical Advisory Board for the pleasant cooperation.

Special thanks go to Daniel Böni, the long-standing Managing Director of the ZAR Foundation, whose extraordinary commitment over more than 15 years has helped us achieve a great deal, and who has built a well-functioning organisation with three Centres of Competence.

At the founding event of the ZAR Foundation, on 21 January 2009, Cantonal Councillor Markus Kägi wished the "ZAR pioneers" great courage to think and act beyond traditional system boundaries – a long breath, great steadfastness, joy and success!

I am happy to add my own wishes to his.



Franz Adam
President of the Board of Trustees

Technical Developments

Kezo, ZAV Recycling AG Hinwil (ZH)

CENTRE OF COMPETENCE FOR DRY BOTTOM ASH TREATMENT

Strategy and Optimisations

In the financial year 2025 too, the ZAR Foundation, at the Centre of Competence for Dry Bottom Ash Treatment in Hinwil, consistently pursued the established path of quality improvement, primarily in collaboration with ZAV Recycling AG. As is traditional, the focus was placed where further significant environmental benefit could be generated, product quality further improved, and process costs further reduced.

The main technological priorities accordingly concerned the following activities:

1. the complete transition from manual hand-sorting of coarse material from MSWI bottom ash (>80 mm) to the newly designed fully automatic robotic sorting,
2. optimisation of the planning for a second "green" treatment line (30–80 mm)
3. ecological assessment of metal recovery, reflecting the technical status as of november 2025 at ZAV Recycling AG,
4. various optimisations of small details with significant impact; and
5. the start of planning for large-scale trials on the utilisation of selected, useful bottom ash fractions together with the cement industry in clinker production.

In addition to the primary focus on treating dry-discharged MSWI bottom ash, initial operating experience was gathered last year with an air-seal- and operational-safety-optimised dry bottom ash discharge system, installed in november 2024 on furnace line 2 of KEZO's Hinwil waste-to-energy plant. These further developments of the technology – which has now been operating reliably for almost 15 years – were undertaken by the Foundation together with Magaldi (a Foundation donor). A guaranteed air

seal between the furnace and the bottom ash discharge is the precondition for the achievement of lower O₂ content in the flue gases of future thermal treatment plants.

Projects Completed in the Reporting Year

Commissioning of Fully Automatic Robotic Sorting of Coarse Material (> 80 mm)

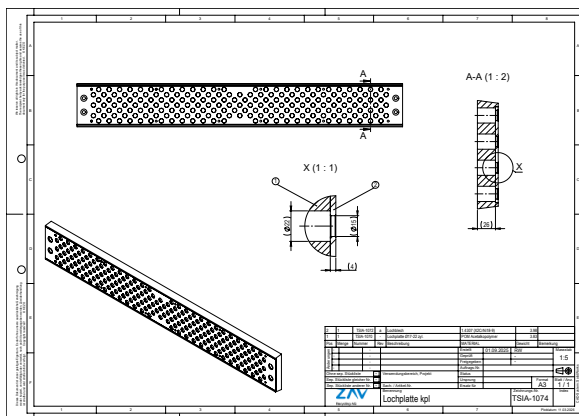
The fully automatic robotic sorting system for coarse material >80 mm, newly designed together with the ZAR Foundation in 2024, was successfully commissioned by ZAV Recycling AG in 2025. It completely replaces the manual sorting operation that had been used since the plant was first commissioned, meaning that fully automatic 24-hour operation can now also be guaranteed for this fraction. Material recognition and sorting are purely optical, based on artificial intelligence, and are carried out according to the colour and shape (geometry) of the particles. This approach exploits a major advantage of dry bottom ash, since the metal and mineral fractions can be distinguished optically both clearly and reliably. This insight will also be of great importance in future for the processing of separated metal mixtures. The robotic sorting system represents a further key step towards fully automated treatment capacity, as the plant approaches its total capacity of 200,000 t of bottom ash, sustainably increasing the efficiency of the entire plant. Following commissioning, product quality was still slightly lower than under the previously used manual sorting, which is attributable to the general limitations of optical sorting rather than to the plant itself



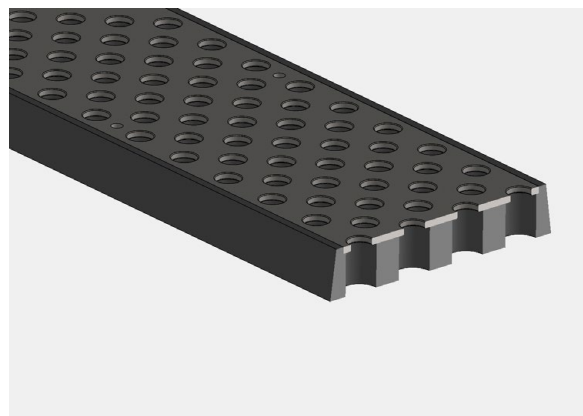
Optimisation of the Planning for a Second “Green” Treatment Line (30 – 80 mm)

Planning for a second “green” treatment line (30–80 mm grain size) was completed towards the end of 2025. Commissioning of this line is scheduled for Q3 2026 and represents a further major step in expanding processing capacity and automating the plant. In the design of the new green line, drum screens are planned instead of linear screens (suitable for < 15 mm), as have already been used successfully in the yellow line (15–30 mm). This is intended to significantly reduce the effort required for screen cleaning. For the first time, a standard impact crusher from Gipo Gisler Power AG will also be used instead of the jaw crusher used previously. The aim of this measure is to significantly reduce blockages in the crusher (in some cases up to five times a day) and the associated wear and maintenance effort.

These drum screens were specially adapted by the ZAR Foundation for reliable operation. In 2025, a further optimisation of a “small” detail was made to the drum screen after the jaw crusher on the yellow line: the existing plastic screen plate was doubled up with a 4 mm metal sheet with smaller holes (see Figs. 1 and 2). The resulting effect is significant. Instead of the previously required cleaning two to three times per week, blockages caused by snagged wires, spoons, etc. could be reduced to practically zero. Maintenance effort for screen cleaning during operation can thus be reduced by roughly a factor of five. The screen area design remains in a similar range to before, at around 30 t/h. The capacity of the new crusher, at 40 t/h, exceeds the planned throughput of the 15–30 mm line.



▲ Fig. 1: Engineering drawing of the perforated plate of the drum screen on the yellow line, with new 4 mm metal plate (original technical drawing; annotations remain in German)



▲ Fig. 2: 3D view of the perforated plate of the drum screen on the yellow line with new 4 mm metal plate (15–13 mm)

Ecological Assessment of Metal Recovery at ZAV Recycling AG – Technical Status november 2025

In the first half of 2025, the Ecological System Design (ESD) group at ETH Zurich once again evaluated data on all recovered metals, after several years, and re-assessed the ecological benefit of primary metal substitution. The measurement campaign ran for four weeks in november 2024 during normal 24/7 production and delivered statistically well-founded data for that month.

The ZAV Recycling AG plant has been modified as follows since the last (much more extensive) material flow analysis and ecological assessment by ETH in 2017: orange lines (<15 mm) – a third treatment stage and adjustment of the grain size range from 12 mm to 15 mm; the second, yellow line (main line) with a modified treatment concept, removal of the stainless-steel sorter, post-cleaning of the aluminium and iron fractions, and various smaller optimisations such as improved metal quality (fewer impurities). Various assumptions from 2017 could be corrected thanks to a better data basis; in the 2024 evaluation, metals without smelter analysis were assessed significantly more conservatively (more realistically). The mineral content of iron scrap had been set too low in 2017 and has been corrected. Stainless-steel metals from the stainless-steel separator had been significantly overrated for contamination in 2017, and this too has been corrected. Copper in the iron scrap fraction was no longer assessed as copper in 2024. On the other hand, as a result of changes in primary production effort, the two eco-factors CO₂ (IPCC) and UBP (environmental impact points) for individual metals for primary metal substitution have changed considerably. Taking all these

changes into account compared with 2017, the overall ecological benefit of primary metal substitution, based on smelter yields with various optimisation measures between 2018 and 2024, could be increased again by almost 20%.

The work carried out by the ZAR Foundation with ZAV Recycling AG and ETH Zurich again shows that reliable ecological comparisons require the following conditions to be met:

- ▶ representative sampling (according to TOS, theory of sampling),
- ▶ smelter analyses obtained directly from the smelting works (Precious, Aluminium, Iron),
- ▶ identical system boundaries and comparable assumptions (e.g. degree of contamination), and identical methodology (impact assessment methods, data status/version for eco-factors).

It would be important and desirable for these insights to also be incorporated into the new tool for assessing the overall ecology of waste-to-energy plants in the Canton of Zurich (AWEL, 2022, Overall Ecological Assessment for Waste Treatment Plants, KVA) and elsewhere.

Start of Planning for Large-Scale Trials on the Utilisation of Magnetic and Mineral Dry Bottom Ash Fractions in Clinker Production, Together with the Cement Industry.

At the end of 2025, the ZAR Foundation began collaborating with ZAV Recycling AG as raw-material supplier, and the cement industry, for the future material and thermal utilisation of bottom ash in clinker production.

The plan envisages the use of two products – iron-rich magnetic and calcium-rich mineral dry residual bottom ash from ZAV Recycling AG – on an industrial scale over extended periods.

Key project objectives will be:

- ▶ demonstrating compliant clinker production (compliance with heavy-metal limit values in the clinker produced, in accordance with Annex 4, para. 1.16, of the Waste Ordinance, VVEA) and the requirements of the Air Pollution Control Ordinance (LRV);
- ▶ assessment of CO₂ saving potential (substitution of primary raw materials by bottom ash fractions);
- ▶ savings in landfill space (use of mineral fractions instead of landfilling);
- ▶ technical feasibility (handling and process integration of the material, acceptance, storage, dosing and sampling).

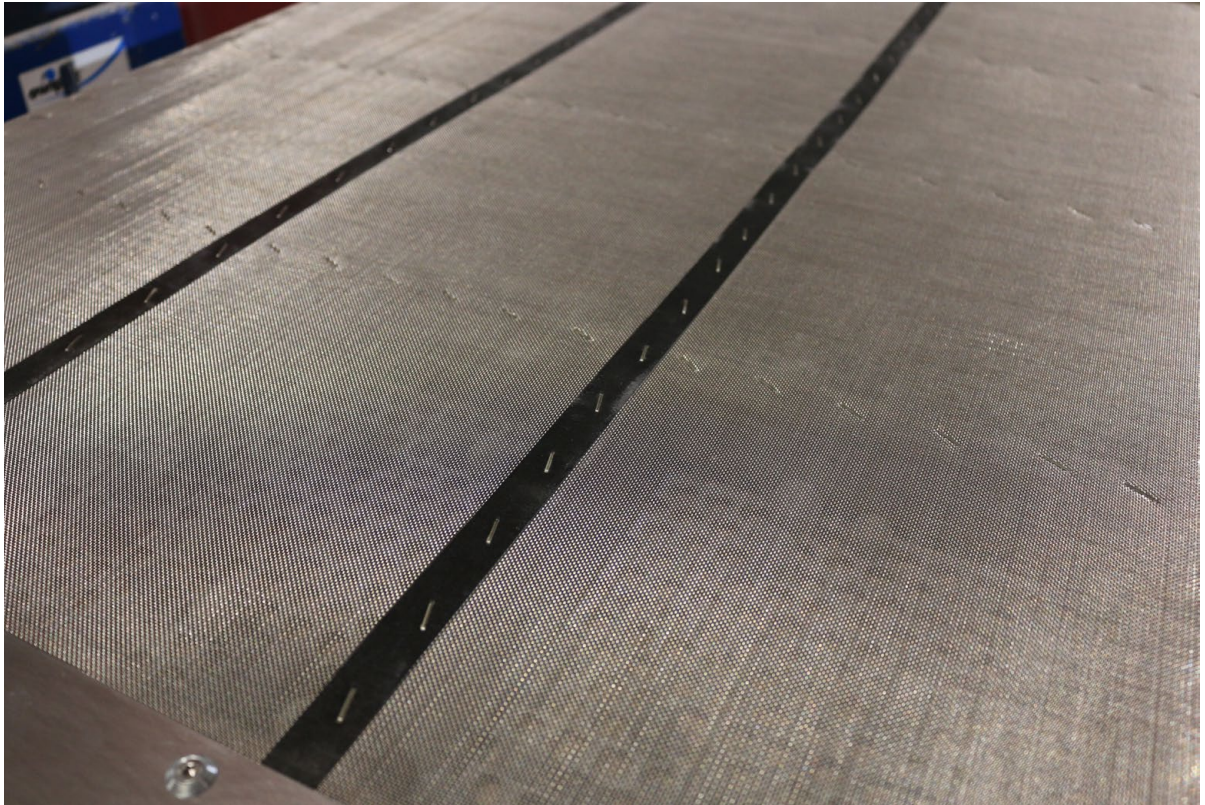
Results are expected by the end of 2026.

Experience with the Further Optimised Dry Discharge System

Initial experience was positive but still showed potential for improvement in the intended air seal, which uses a bottom ash bulk cone from the shaft onto the conveyor belt (plug flow leads to blockages at the first height reduction in the discharge, partly because KEZO bottom ash is very coarse due to the waste composition). To resolve the problem, a pivoting flap with counterweights was installed, which opens more or less depending on the bottom ash pressure; blockages subsequently became less frequent. The currently still insufficient bottom ash column height of around 30 cm could be increased to 60 cm with a slide-gate solution, which would significantly improve sealing. It was also found that opening the bottom ash channel angle by 3–5° could largely prevent blockages caused by large iron scrap parts (racks, iron beams, metal doors). These insights are important for the construction of future plants, in order to guarantee even more efficient (firing) and trouble-free (discharge) overall operation.



▲ Figs. 3 and 4: Iron-rich magnetic (right) and calcium-rich mineral (left) residual bottom ash from ZAV Recycling AG, as future raw materials in clinker production.



▲ Fig. 5: Section of the linear vibrating screen for fine bottom ash from dry bottom ash treatment at ZAR Recycling AG.

Our Vision

We regard waste as a potential raw material.



Quality



In demand
on the market



Transparent
processes

Outlook:

- ▶ Joint industrial-scale trials on the thermal and material utilisation of magnetic and mineral bottom ash fractions together with the cement industry in clinker production.
- ▶ Various studies on further (precious-)metal recovery.
- ▶ Project for fine-iron treatment (< 80 mm) developed, with the aim of further increasing product quality and ensuring sales security.
- ▶ Commissioning of the new bottom ash treatment line for the 30 – 80 mm fraction, aimed at improving metal quality, achieving a higher degree of automation and reducing operating costs.



Team Bottom Ash Competence Centre Hinwil (ZH)

Dr. Leo Morf

ZAR

Oliver Schäppi

René Weber

Roger Kunz

ZAV Recycling AG

CENTRE OF COMPETENCE FOR HYDROMETALLURGY

At the Zuchwil site, work in 2025 – alongside further preparatory work for implementing phosphorus recovery from sewage sludge ash – focused mainly on the construction of kenova's new waste-to-energy plant (WtE), the commissioning of the new FLUWA plant, and the orderly decommissioning of the FLUREC plant.

SwissZinc and FLUREC

After 13 years of successful operation, the FLUREC plant – and with its world-wide first and only zinc recovery out of WtE fly ash, producing pure zinc for direct sale on the domestic Zn market – had to be shut down at the Emmenspitz site. The reasons for this are not process-related but rather a consequence of the delay to the SwissZinc project and the doubling of capacity of the new FLUWA plant as part of kenova's rebuild. From the outset, kenova opted for the SwissZinc route and based its entire conceptual planning on this approach. The rebuild of the WtE also involved doubling the capacity of the FLUWA plant, so that Switzerland has sufficient fly-ash treatment capacity to meet the statutory metal-recovery obligation. This doubling exceeds the recovery capacity of the FLUREC process twofold, meaning that an alternative utilisation solution is required as an interim measure until the SwissZinc plant is realised.

Phosphorus Recovery

As a result of the current geopolitical upheavals, rising fertiliser prices and major problems in procuring high-quality fertilisers are commonplace. The circular economy would be the right response here and represents a major opportunity for high-quality phosphorus recycling from the wastewater pathway. Despite all these favourable conditions, implementing the internationally pioneering, Switzerland-wide circular-economy project for phosphorus has proven far from straightforward. The Phos4life technology, developed for this purpose by the ZAR Foundation together with the renowned Spanish industrial partner Técnicas Reunidas, has been evaluated and is ready for implementation at the Emmenspitz site.

Establishing the sponsorship body for the planned central, supra-regional phosphorus recycling plant at Emmenspitz, with the participation of sewage sludge ash suppliers from several cantons, is taking longer than planned. Some stakeholders have already found ways to move the project forward, while others still need greater clarity or certainty for the necessary decisions. The goal of founding a public limited company in 2025 and handing the "ZAR child" into the care of its "new parents" could not be achieved. Instead, those responsible for the planned organisation sponsorship body decided to suspend the project until the cantonal waste-management plans and the last open financial questions are clarified – hopefully by the end of 2027.

FLUWA Platform and WtE “Fly Ash” Activities

The Switzerland-wide exchange of experience under the “FLUWA Platform” (FLUWA = fly-ash washing process in waste-to-energy plants with metal recovery), coordinated by the ZAR Foundation, was also successfully continued in 2025 with two events. FLUWA plant operators gain access here to extensive practical experience and support in solving problems, which is highly valued by all participants. Learning from one another’s practical experience helps to keep plant availability high and to address, as far as possi-

ble in a preventive manner, the technical challenges that can always arise with variable waste input. We would like to take this opportunity to sincerely thank the Association of Swiss Waste Treatment Plant Operators (VBSA) for its administrative and organisational support of this platform, and the participants for their open and constructive communication, which is essential to the success of this work.



Hydrometallurgy Team kenova, Zuchwil (SO)

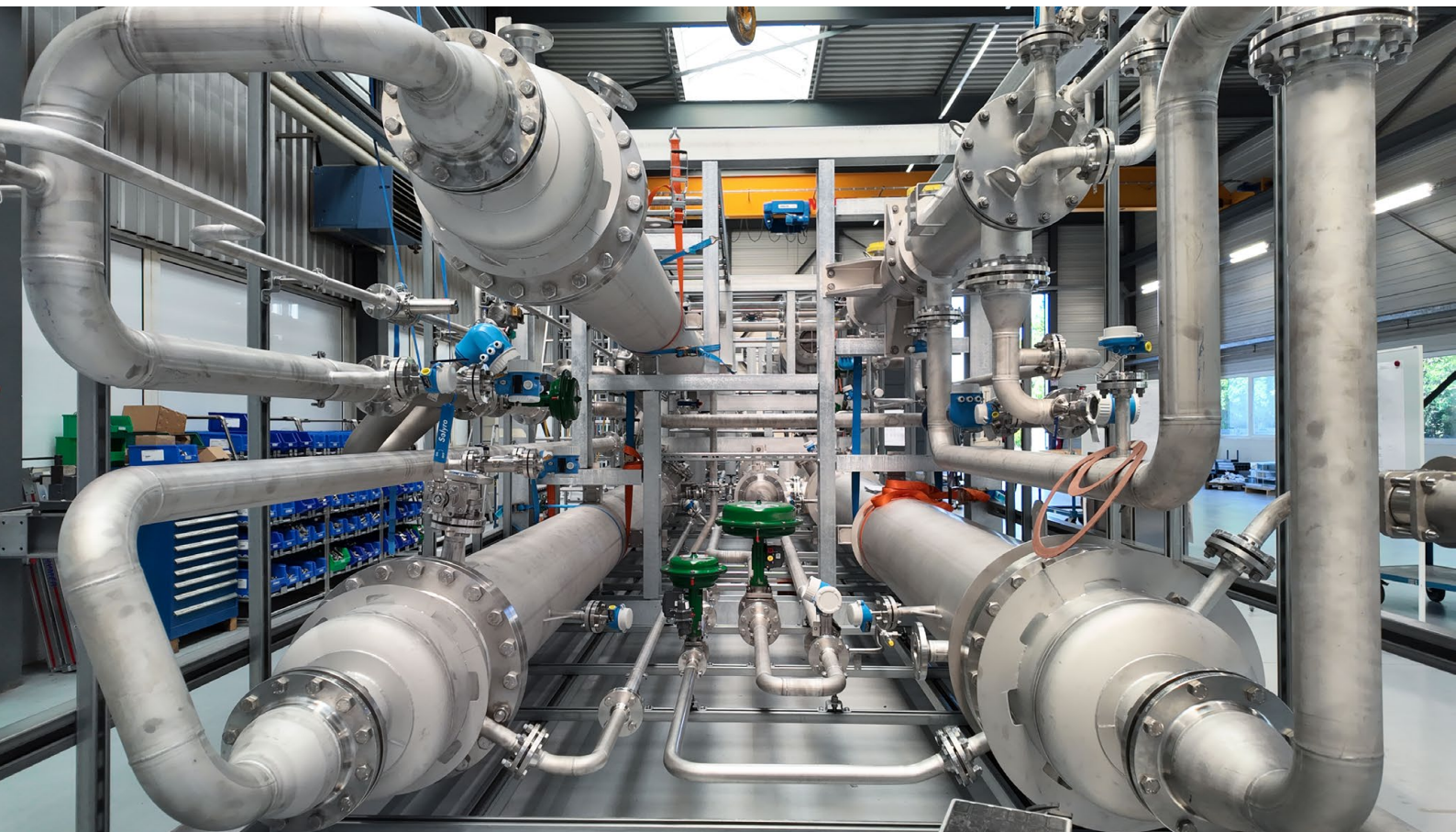
Dr. Stefan Schlumberger

Head of the Centre of Competence for Hydrometallurgy

Dr. Andreas Bernhard

Development Engineer

- ▼ HPC pilot plant built by Sulzer Chemtech Division in the assembly hall, for installation at the KEZO Hinwil waste-to-energy plant. (Image source: Sulzer)



CO₂ CENTRE OF COMPETENCE

The ZAR CO₂ Centre of Competence investigates the use of CO₂ capture plants at waste-to-energy facilities, with subsequent use or permanent storage of the CO₂. The work packages contractually defined with the Federal Office for the Environment (FOEN) for the 2022–2025 period, shown in Fig. 6, were completed on schedule. They covered technical, regulatory and strategic questions.

Work Packages	
AP1:	Establishment of the CO ₂ Centre of Competence
AP2.1:	Risk analyses
AP2.2:	Environmental monitoring
AP2.3:	Process monitoring
AP3:	Optimisation of flue-gas cleaning (Air pollution control system)
AP4.1:	Heat integration
AP4.2:	Utilisation
AP4.3:	Storage
AP5:	Preliminary project
AP6:	International logistics
AP7:	Legal matters and permits
AP8:	Financing
AP9:	Communication

▲ Fig. 6: The work packages completed by the CO₂ Centre of Competence, per the contract, by the end of 2025.

Capture Processes Suitable for Waste-to-Energy Plants

In the “process monitoring” work package, technologies based on absorption, adsorption, membranes and oxyfuel combustion were examined for their maturity and suitability for waste-to-

energy plants. As things stand today, two processes – amine scrubbing and Hot Potassium Carbonate (HPC) – are the two absorption technologies that can be implemented at waste-to-energy plants in the near term. Given the dynamic pace of technological development, the CO₂ Centre of Competence will continue to track the development of the various capture processes in future and incorporate new findings into its work. In particular, there are exciting developments in membrane technology, so that use at waste-to-energy plants is conceivable in the near future. The long-term stability of the membranes should be demonstrated by means of a pilot plant on a real waste-to-energy flue-gas stream, since there is not yet sufficient experience for this application.

Environmental and Health Aspects of Amine Scrubbing

In the “environmental monitoring” work package, the focus in 2024 was on dispersion modelling of pollutants from amine-scrubbing CO₂ capture plants. These pollutants can react in the atmosphere to form partly carcinogenic compounds, which is why the modelling is important but also very complex. Measurement trials at KVA Linth and discussions with measurement-technology experts also showed that the low pollutant concentrations expected in the ambient air near amine-scrubbing capture plants cannot be verified by measurement.

Modelling was completed for the Swiss WtE-plants in Horgen (EZI, State of Zurich) and Linth (KVA Linth, State of Glarus). The results show that, under the assumptions made, low pollutant concentrations are to be expected in the ambient air. The dispersion model is now available to all interested emitters, and modelling can be carried out by TU Graz.

Comparison of Amine Scrubbing and the HPC Process

The two capture processes – amine scrubbing with monoethanolamine (MEA), and HPC without additives – were examined in detail and compared with one another as part of the “CCS Linth” project at KVA Linth. To this end, the findings from all work packages were brought together. An important basis was the preliminary project (Vorprojekt), which was developed for both processes jointly with several technology suppliers and the planning/consulting companies TBF + Partner AG and Ramboll AG.

Thirteen criteria were defined for the process comparison, which can be grouped into the following categories:

- ▶ Technological maturity (Reifegrad)
- ▶ Investment and operating costs (Kosten)
- ▶ Health protection and environmental compatibility (Umwelt/Gesundheit/Bewilligung)
- ▶ Integration of the capture plant into the WtE plant of KVA Linth (Energie/Integration)
- ▶ Operation of the CO₂ capture plant (Betrieb)

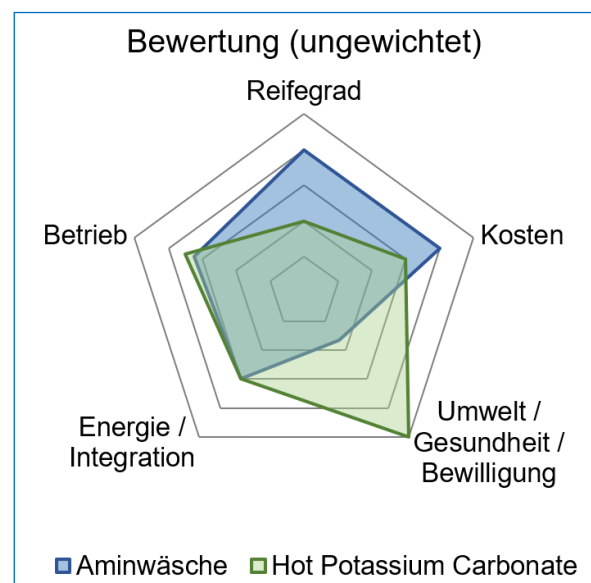
The criteria were subsequently weighted, and the processes were then evaluated. The approach, and in particular the weighting, was agreed with the Board of Directors of KVA Linth.

The radar chart in Fig. 7 graphically presents the unweighted evaluation of the two processes. It is important to note that this evaluation reflects the current state of knowledge (2025) and is based on site-specific considerations at KVA Linth. It cannot be generalised or transferred to other WtE plants without adjustment. Should new findings emerge, a reassessment is possible at any time. In summary, amine scrubbing performs better mainly in terms of cost and maturity. In the area of environmental and health risks – and therefore also acceptance and ap-

provability – the HPC process has the advantage due to its non-toxic washing solution. As this area was weighted heavily, the HPC process achieved a higher overall score than amine scrubbing in this example.

Life-Cycle Assessment, CCS Linth

At a capture rate of 90%, all Swiss waste-to-energy plants together would capture around 3.6 million tonnes of CO₂ annually. The analyses in the “utilisation”, “storage” and “international logistics” work packages show that the majority of this must be stored geologically (CCS). As domestic storage capacity is limited in the medium term, building international process chains is necessary.



▲ Fig. 7: Unweighted evaluation of the two capture technologies, amine scrubbing and the HPC process, specific to the KVA Linth site.

The Centre of Competence examined how efficient such an international CCS process chain is from a climate perspective, and what emissions the project causes. To answer this question, the research group of Professor Bardow at ETH Zurich carried out a life-cycle assessment for the CCS Linth project. All process steps from capture to geological storage were considered. Existing plants – in particular the waste-to-energy plant itself – were not included; only additional emissions arising from the CCS project were considered. The reduced energy output of KVA Linth, due to the energy demand of CO₂ capture and processing, is taken into account.

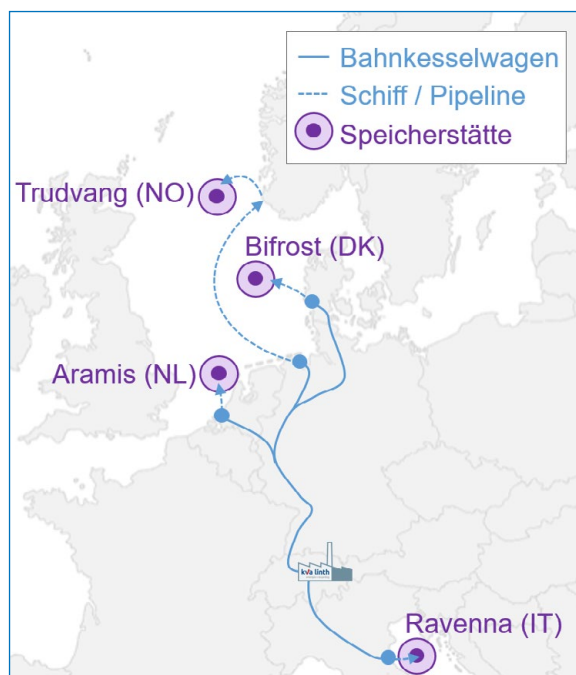
The following were compared:

- ▶ Amine scrubbing (MEA) and the HPC process (without additives)
- ▶ Hybrid coolers and cooling towers
- ▶ Four storage options: Ravenna (IT), Aramis (NL), Bifrost (DK), Trudvang (NO).

The transport routes to the storage sites considered are shown in Fig. 8. This selection makes it possible to examine and compare the varying lengths of transport route in terms of their effect on the amount of CO₂ effectively avoided.

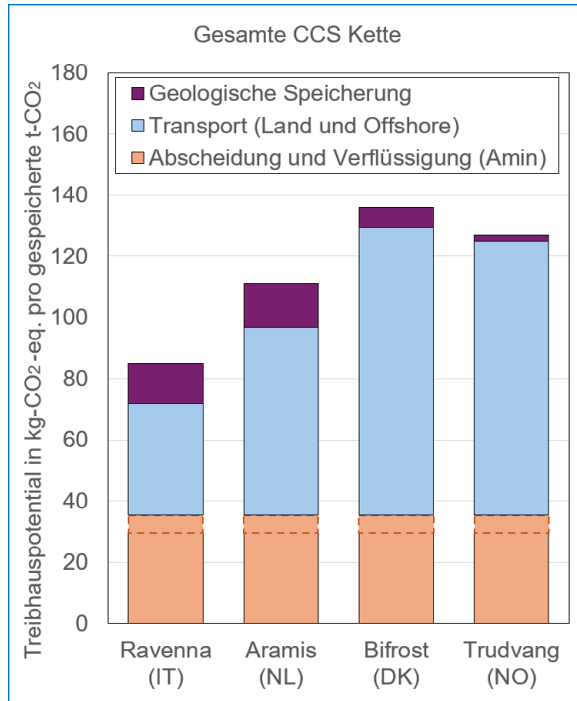
Results of the Life-Cycle Assessment

Fig. 9 shows the project emissions of the entire CCS chain for the four storage options. Under the assumptions made, the HPC process shows a somewhat lower global warming potential than amine scrubbing. Overall, the chosen storage site and the associated transport route influence project emissions considerably more strongly than the choice of CO₂ capture process.



▲ Fig. 8: Transport and storage options considered in the life-cycle assessment: Ravenna, Aramis, Bifrost and Trudvang (schematic diagram, not geographically precise). (Bahnkesselwagen = rail tank wagon; Schiff = ship; Speicherstätte = Final storage site).

The lowest emissions arise with HPC and the Ravenna storage site option (approx. 79 kg CO₂-eq. per tonne of CO₂ stored), and the highest with amine scrubbing and Bifrost (approx. 136 kg CO₂-eq./t). Overall, the emissions caused by the project correspond to 7.9–13.6% of the amount of CO₂ stored. This shows that transport distance has a relevant influence, but that emissions are moderate in all cases considered, and that the project makes sense from a climate perspective in any case. Project emissions are expected to fall further in future, in particular as the CO₂ intensity of electricity production in Europe decreases, and as CO₂ pipelines become available for onshore transport, since these require significantly less energy than transport by rail tank wagon.



▲ Fig. 9: CO₂-eq. emissions (global warming potential) of the entire CCS chain (Gesamte CCS-Kette). Capture emissions shown are for amine scrubbing; the HPC process causes slightly lower CO₂-eq. emissions (6 kg CO₂-eq. per tonne of CO₂ stored), indicated by the red dashed outline in the original chart (redrawn; values approximate). Abscheidung und Verflüssigung (Amin) = Capture and liquefaction (amine); Geologische Speicherung = geological storage).

Financing and Outlook

Overarching questions were addressed in the "risk analysis", "legal matters and permits", "financing" and "communication" work packages.

Financing currently represents the greatest challenge. At present, the framework conditions for implementing large-scale CCS projects at waste-to-energy plants in Switzerland are not in place. Developing and implementing a financing solution for CCS projects at such plants is extremely complex and multi-layered. What is

needed is a financing concept that reflects the polluter-pays principle and enjoys broad support. An approach based on raising the incineration fee currently exists in outline for the fossil CO₂ share. However, the legal basis required for this is still lacking. As financing is currently unresolved, the CCS Linth project must be paused.

By contrast, the HPC pilot plant at KEZO in Hinwil is encouragingly moving ahead. The plant is currently being manufactured and will be commissioned at the end of 2026. This project will continue to be closely accompanied by the CO₂ Centre of Competence.

Reference to the Final Report

A comprehensive final report covering all work packages for 2022–2025 has been published and is available for download on the websites of the ZAR Foundation and KVA Linth.



CO₂-Competence Centre KVA Linth/ZAR Team, Niederurnen (GL)

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Dr. Cinia Schriber

Project Engineer, CO₂ Centre of Competence

Public Relations

Centre of Competence KEZO/ZAV Recycling AG, Hinwil

Interest from Switzerland and abroad remained strong in 2025. Numerous delegations were received and informed about thermo recycling, the development projects, and the 24/7 operation of bottom ash treatment at ZAV Recycling AG.

Visitor Groups / Tours

- ▶ Belimo AG, Hinwil
- ▶ CMRA (China Nonferrous Metals Industry Association Recycling Metal Branch)
- ▶ Alberto Cerri, Association for Sustainable Business (Öbu, Zurich)
- ▶ Entsorgung Zimmerberg EZI, KVA Horgen
- ▶ Entsorgung Recycling Zürich, ERZ
- ▶ Lucerne University of Applied Sciences
- ▶ Holcim Schweiz AG
- ▶ Holcim AG, Untervaz Works
- ▶ L. Hermann (Proman) with a Japanese delegation
- ▶ Kanadevia Inova AG – Emerald
- ▶ Kanadevia Inova AG – Corporation J
- ▶ Kanadevia Inova AG – TAKEEI
- ▶ Kanadevia Inova AG, Zurich
- ▶ Limeco, KVA Limmattal
- ▶ Magaldi Industrie s.r.l.
- ▶ Martin GmbH – PAPREC
- ▶ Reichle & De-Massari AG
- ▶ Satom SA – Weibel AG
- ▶ Saidef SA
- ▶ SGM MAGNETICS S.p.A (IT) with customers
- ▶ Stadtwerk Winterthur, KVA Winterthur
- ▶ VfA Buchs / Association for Waste Disposal, KVA Buchs AG (Urs Brunner)
- ▶ FOEN
- ▶ ZAV Logistik AG

Conferences

- ▶ 15 Years of ZAR Conference, Bern
- ▶ Tri-National Conference, Neuchâtel, CH
- ▶ IBAX Meeting, Parma (IT)

Centre of Competence kenova, Zuchwil

Visitor Groups / Tours

- ▶ Hermann, L. (Proman) with a Japanese delegation
- ▶ ERZ Hagenholz
- ▶ SATOM
- ▶ Renergia
- ▶ Stadtwerk Winterthur, KVA Winterthur
- ▶ FOEN
- ▶ ProRhenio Basel
- ▶ MMI Metals

Conferences

- ▶ 15 Years of ZAR Conference, Bern
- ▶ SAIDEF General Assembly
- ▶ VDI Specialist Conference, Magdeburg (DE)

CO₂ Centre of Competence, KVA Linth

Contributions / Presentations / Visitor Groups

- ▶ Information event for KVA Linth delegates / municipal representatives
- ▶ Power-to-X Interest Group (IG PtX)
- ▶ ERFA meeting for district-heating experience exchange
- ▶ Information event for host cantons
- ▶ Information event, Entsorgung + Recycling Zürich (ERZ)
- ▶ New Line meeting, Zurich
- ▶ Information event, Natural History Societies of the Cantons of Glarus, Schwyz and St Gallen

Conferences

- ▶ 15 Years of ZAR Conference, Bern
- ▶ CO₂ Congress Bern, Swiss Gas Industry Association
- ▶ VBSA Climate Fund Event, St Ursanne

International Trips

- ▶ Visit to a membrane technology demonstration plant in Gillette, USA, and to an adsorption technology provider in Vancouver, Canada.

Excerpt from the Foundation Certificate

The Foundation

Art. 2 Purpose of the foundation

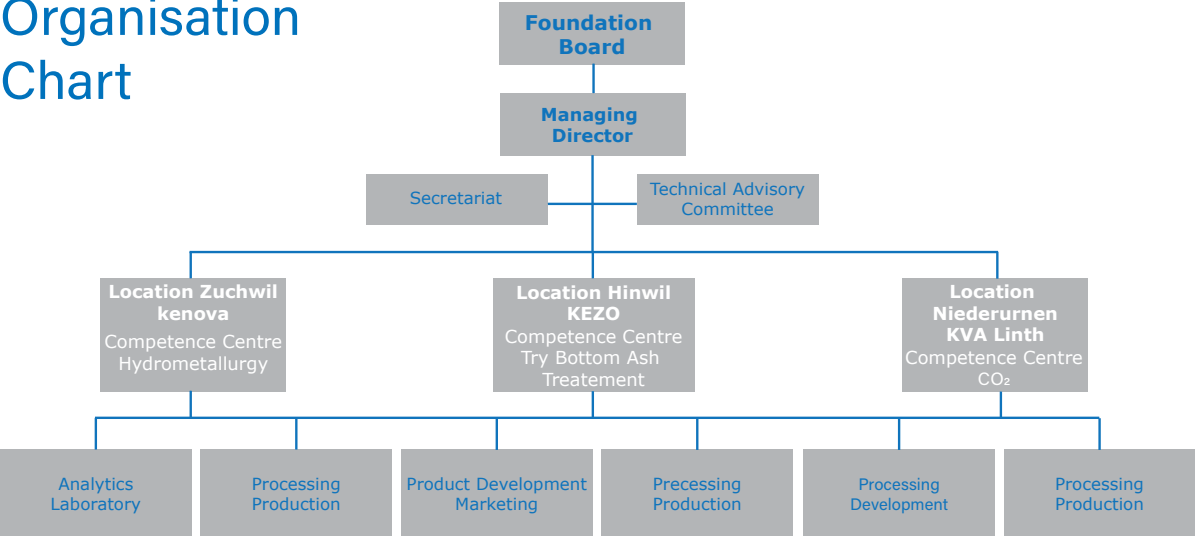
The purpose of the foundation is to promote a sustainable materials policy for the treatment and recycling of waste. It promotes the further development of state-of-the-art technology and supports the corresponding development activities which are to take place in the immediate vicinity of the waste-to-energy plant of the Zweckverband Kehrichtverwertung Zürcher Oberland KEZO in Hinwil/ZH or its legal successor. The foundation can also support the commercial exploitation of

the findings. With a broad Swiss sponsorship and cooperation with interested parties, it is intended to ensure that the knowledge gained is incorporated into plant development and plant construction in Switzerland or abroad. The purpose of the foundation can be extended to activities with similar objectives at a later date. We reserve the right to change the purpose of the foundation in accordance with Art. 86a ZGB (Swiss Civil Code). The foundation does not pursue any commercial purposes and is not profit-oriented.

Founder

VBSA	Verband der Betreiber Schweizerischer Abfallverwertungsanlagen (Swiss Association of Waste-processing Plants)
Kanton Zürich	Baudirektion, Amt für Abfall, Wasser, Energie und Luft (AWEL) (Department for Waste, Water, Energy and Air of the Canton of Zurich)
KEZO	Zweckverband Kehrichtverwertung Zürcher Oberland, Hinwil (Association of Waste Disposal for the Zurich Oberland, Hinwil)

Organisation Chart



Board of Trustees

Adam, Franz (President)	Senior Consultant, until 31.12.2025
Morgan, Kurt	Managing Director, NEROS Swiss Mineral Raw Materials Network; President from 1.1.2026
Brunner, Urs	Managing Director, VfA – Association for Waste Disposal Buchs SG
Christen, Daniel	Managing Director, SARS Swiss Car Recycling Foundation
Furgler, Walter	Managing Director, KVA Linth
Dr. Gablinger, Helen	Kanadevia Inova AG, Director Product & Marketing, Energy from Waste
Juchli, Markus	Director, kenova AG
Marti, Jakob	Former Head of Department for Environment, Forests and Energy, Glarus
Martin, Ulrich	Owner, MARTIN GmbH
Dr. Schucan, Christian	President of the Board of Directors, KEZO Hinwil

Technical Advisory Board

Dr. Morf, Leo (Chair)	AWEL, Waste Management Section, KVA Sewage Sludge Disposal; until 1.11.2025
Dr. Liechti, Jürg	Neosys AG, Gerlafingen; Chair from 1.11.2025
Bolliger, Markus	Jura Cement AG, Wildeggen
Budde, Ivo	Kanadevia Inova AG
Prof. Dr. Ing. Deike, Rudiger	Institute for Metallurgy, University of Duisburg-Essen
Eicher, Nina	AWEL, Waste Management Section, KVA Sewage Sludge Disposal; from 1.1.2026
Prof. Dr. Hellweg, Stefanie	ETH Zurich, Institute of Environmental Engineering, Zurich
Dr.-Ing. Koralewska, Ralf	MARTIN GmbH, Munich
Dr. Lieball, Kai	Kanadevia Inova AG
Dr. Ing. Warnecke, Ragnar	GKS – Gemeinschaftskraftwerk Schweinfurt GmbH
Weber, René	ZAV Recycling AG, Head of Technology
Wermeille, Christiane	Federal Office for the Environment (FOEN), Head of Raw Materials and Waste Division
Wölm, Fabian	Managing Director, AIK Technik AG; from 1.1.2026

Donations

AIK Technik AG	Sursee
ERZ Entsorgung + Recycling Zürich	Zürich
Entsorgung Zimmerberg	Horgen
Kanadevia Inova AG	Zürich
kenova AG	Zuchwil
KEZO Zweckverband Kehrichtverwertung Zürcher Oberland	Hinwil
Magaldi Industrie s.r.l.	Salerno (IT)
MARTIN GmbH	München (DE)
SARS Stiftung Auto Recycling Schweiz	Bern
SATOM AG	Monthey
Verband KVA Thurgau	Weinfelden
ZAV Recycling AG	Hinwil
Zweckverband KVA Linth Energie + Recycling	Niederurnen

Project Contributions, CO₂ Centre of Competence

Federal Office for the Environment (FOEN)	Bern
VBSA Climate Fund	Bern
KVA Linth	Niederurnen
KEZO Kehrichtverwertung Zürcher Oberland	Hinwil
Stiftung Glarner Kantonalbank	Glarus



Financial Report

Income Statement

	2025	Budget 2025	2024
	[CHF]	[CHF]	[CHF]
Donation income	460 000.00	490 000.00	510 000.00
Other Income	10 210.43	0.00	1 257.40
Subsidies, FOEN grants	20 000.00	322 800.00	426 600.00
Service income	188 003.00	690 000.00	596 211.40
Income	678 213.43	1 502 800.00	1 534 068.80
Cost of materials	- 784.70	- 125 000.00	- 1 434.00
Cost of Analyses	0.00	- 60 000.00	- 17 909.22
Expenses for third-party services	- 293 756.16	- 1 160 000.00	- 1 111 955.88
Change in Project reserves	362 424.75	750 800.00	422 037.49
Expenses for materials, goods and third-party services	67 883.89	- 594 200.00	- 709 261.61
Gross result after cost of materials and goods	746 097.32	908 600.00	824 807.19
Wages and salaries (Labor cost)	- 528 459.67	- 646 700.00	- 555 108.18
Social security costs	- 113 298.25	- 140 000.00	- 119 349.33
Training and further education of employees	- 1 453.78	0.00	- 2 351.30
Other personnel expenses	- 1 200.00	- 18 800.00	- 10 799.20
Third-party labour, miscellaneous	- 662.10	0.00	0.00
Personnel expenses	- 645 073.80	- 805 500.00	- 687 608.01
Gross result after personnel expenses	101 023.52	103 100.00	137 199.18
Maintenance and repairs	0.00	0.00	- 1 403.73
Administrative expenses	- 31 875.59	- 65 000.00	- 53 591.82
IT	- 7 286.80	- 8 000.00	- 7 094.80
Advertising expenses	- 32 790.81	- 25 000.00	0.00
Representation expenses	- 632.50	- 2 000.00	- 2 990.93
Board of Trustees costs	- 4 625.29	- 6 000.00	- 4 933.92
Technical Advisory Board costs	0.00	- 500.00	- 159.06
Other operating costs	0.00	0.00	- 88.30
Travel expenses	- 2 446.66	- 3 000.00	- 2 315.36
Board of Trustees fees	0.00	0.00	0.00
Other operating expenses	- 1 278.63	0.00	0.00
VAT expense on subsidies	- 1 498.61	0.00	- 41 059.55
Other operating expenses (total)	- 82 434.89	- 109 500.00	- 113 637.47
Operating result before depreciation and interest	18 588.63	- 6 400.00	23 561.71
Depreciation	0.00	0.00	0.00
Operating result before interest	18 588.63	- 6 400.00	23 561.71
Financial expenses	- 400.05	- 300.00	- 283.41
Financial income	7 385.41	15 000.00	16 950.00
Annual profit (Profit (+), Loss (-))	25 573.99	8 300.00	40 228.30

Balance Sheet

	31. 12. 2025	31. 12. 2024
	[CHF]	[CHF]
Assets		
Raiffeisenbank current account	1 656 847.56	2 391 143.83
Raiffeisen savings account	4 800.52	0.00
Cash and cash equivalents	1 661 648.08	2 391 143.83
Trade receivables, third parties	350 698.85	571 336.40
FTA receivable	17 858.72	14 230.62
Withholding tax credit	2 584.89	5 932.50
Trade receivables from goods & services	371 142.46	591 499.52
Current assets	2 032 790.54	2 982 643.35
Movable Fixed Assets		
iCAP 7600 ICP-OES Duo (analytical instrument)	87 789.84	87 789.84
SpectroBlue 138491	60 217.92	60 217.92
Vibrating disc mill	22 109.83	22 109.83
Valuation adjustments, tools and equipment	-170 117.59	-170 117.59
Movable assets	0.00	0.00
Fixed assets	0.00	0.00
Total assets	2 032 790.54	2 982 643.35
Liabilities		
Accounts payable to third parties	462 340.48	841 796.07
Liabilities from deliveries & services	462 340.48	841 796.07
Accrued expenses and deferred income (TP)	0.00	233 546.46
Deferred Projects	1 261 702.96	1 624 127.71
Accrued expenses and deferred income	1 261 702.96	1 857 674.17
Short-term liabilities	1 724 043.44	2 699 470.24
Foundation capital	100 000.00	100 000.00
Foundation capital	100 000.00	100 000.00
Retained earnings / accumulated losses carried forward (Project reserves)	183 173.11	142 944.81
Annual profit / loss	25 573.99	40 228.30
Reserves, retained earnings	208 747.10	183 173.11
Equity capital	308 747.10	283 173.11
Total liabilities	2 032 790.54	2 982 643.35



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An den Stiftungsrat der

Stiftung Zentrum für nachhaltige Abfall- und Ressourcennutzung ZAR, Hinwil

Brüttisellen, 28.04.2026

Bericht der Revisionsstelle zur eingeschränkten Revision

Als Revisionsstelle haben wir die Jahresrechnung (Bilanz, Erfolgsrechnung und Anhang) der Stiftung Zentrum für nachhaltige Abfall- und Ressourcennutzung ZAR für das am 31.12.2025 abgeschlossene Geschäftsjahr geprüft.

Für die Jahresrechnung ist der Stiftungsrat verantwortlich, während unsere Aufgabe darin besteht, die Jahresrechnung zu prüfen. Wir bestätigen, dass wir die gesetzlichen Anforderungen hinsichtlich Zulassung und Unabhängigkeit erfüllen.

Unsere Revision erfolgte nach dem Schweizer Standard zur Eingeschränkten Revision. Danach ist diese Revision so zu planen und durchzuführen, dass wesentliche Fehlaussagen in der Jahresrechnung erkannt werden. Eine eingeschränkte Revision umfasst hauptsächlich Befragungen und analytische Prüfungshandlungen sowie den Umständen angemessene Detailprüfungen der beim geprüften Unternehmen vorhandenen Unterlagen. Dagegen sind Prüfungen der betrieblichen Abläufe und des internen Kontrollsystems sowie Befragungen und weitere Prüfungshandlungen zur Aufdeckung deliktischer Handlungen oder anderer Gesetzesverstösse nicht Bestandteil dieser Revision.

Bei unserer Revision sind wir nicht auf Sachverhalte gestossen, aus denen wir schliessen müssten, dass die Jahresrechnung nicht dem schweizerischen Gesetz, der Stiftungsurkunde sowie den Reglementen entspricht.

baumgartner & wüst gmbh



digital signant

Simon Wüst
Zugelassener Revisionsexperte
(Prüfungsleitung)



digital signant

Ulrich Baumgartner
Zugelassener Revisionsexperte

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STIFTUNG ZENTRUM FÜR NACHHALTIGE ABFALL- UND RESSOURCENNUTZUNG

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