Thermal Treatment
of tar-contaminated asphalt

Realisation of the first plant in Germany

Raw material recovery through innovative asphalt processing in the Harz Mountains

IVH Industriepark und Verwertungszentrum Harz GmbH
A member of the Bettels-Group, Hildesheim

The IVH – A large area for recycling industries and utilization of mineral waste in the heart of Germany

- Company location in Goslar-Oker / Bad Harzburg-Harlingerode centrally between Hannover, Magdeburg, Halle/Saale and Kassel
- 60 hectares of recycling area and 90 hectares for utilization of mineral waste
- Easy access to the A7 and A36 highways
- Til 2027 construction of an already approved rail transshipment facility for mineral waste as well as primary and secondary mineral building materials

Business areas of IVH (1)

Rental, leasing and infrastructure services

- Operation of an industrial park in Goslar-Oker / Bad Harzburg-Harlingerode on a former smelting site with the focus on „recovery of raw materials“
- Implementation of central infrastructure services as weighing, internal logistics by truck/rail, maintenance/expansion of road and path networks, media supply, wastewatertreatment

Recycling lead-acid batteries

- Recovery of lead and polypropylene from starter batteries, e.g. from cars and forklifts
- New plant is being planned, as the first plant in Germany including production of nitrogen fertilizer from the sulfuric acid contained in the batteries using RiA waste heat (recycling rate = 98%)

Business areas of IVH (2)

Ulilization of lightly contaminated soils for the remediation of contaminated sites

- Acceptance and utalization of large quantities of mineral waste up to Z2 in accordance with LAGA M 20 or BG-F3/BM-F3/RC3 in accordance with EBVO for the remediation of existing contaminated sites on the smelting site
- Modeling/naturalization of the dump and landfill landscape to adapt to the typical regional landscape

Future-oriented development of the industrial location

- Development of new recycling technologies until they are ready for implementation for the efficient and sustainable use of limited resources => RiA.H
- Self-sufficient supply of the industrial site using renewable energies (hydropower and wind turbines, photovoltaic systems)

Removed asphalt = mineral waste to be used

- Asphalt waste occurs when roads/paths are dismantled/converted/ rehabilitated and contains of:

  95 - 96 % natural rock aggregates and 4 - 5% bitumen
- Until the 19080s, pitch/tar (from the coking hard coal) was used as a binding agent in road construction both in its pure form and with bitumen (distillation product from petroleum), after which only bitumen was permitted
- Pitch/tar contains polycyclic aromatic hydrocarbons = PAH (carcinogenic)
- Definition of tar-containing asphalt: Contains 0,0025 - 0,2 % PAH or more
- Asphalt containing tar is classified as hazardous waste (AVV 170301*)
- The lifespan of road surfaces is between 15 and 20 years, very often only the top layer is replaced, therefore there are bituminous over tar-containing layers

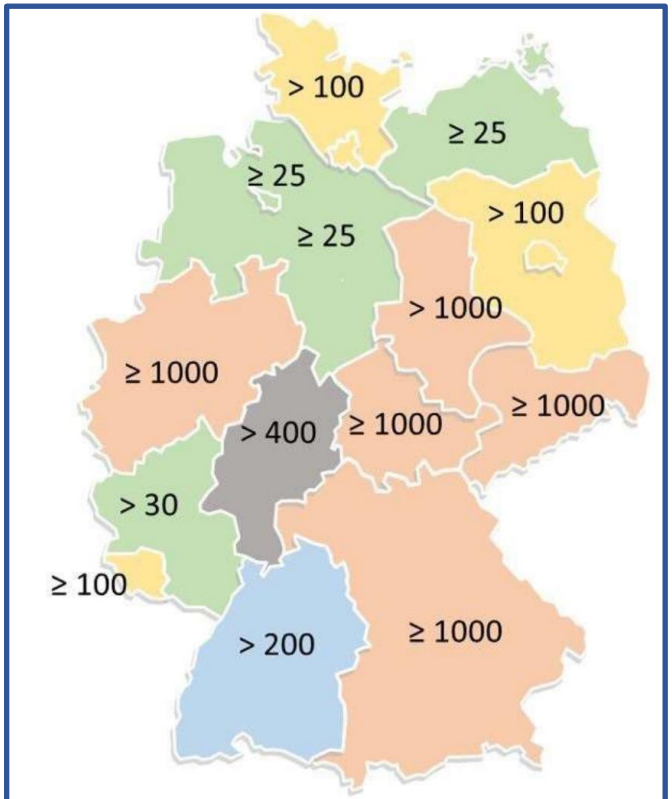
Framework conditions & status quo - nationwide

- The german road network contains approx. 1 billion tons of tar-containing asphalts

- Annual volume under waste-code
- 170301* (hazardous waste) : 3 - 4 Mio. Tons

- 2/3 of this waste recorded in Germany comes from NRW, NDS, RP und BY

- Landfilling in D and thermal treatment in the NL are the main disposal routes
- Landfilling with an increasing trend, ⌀ 2 Mio. tons/year

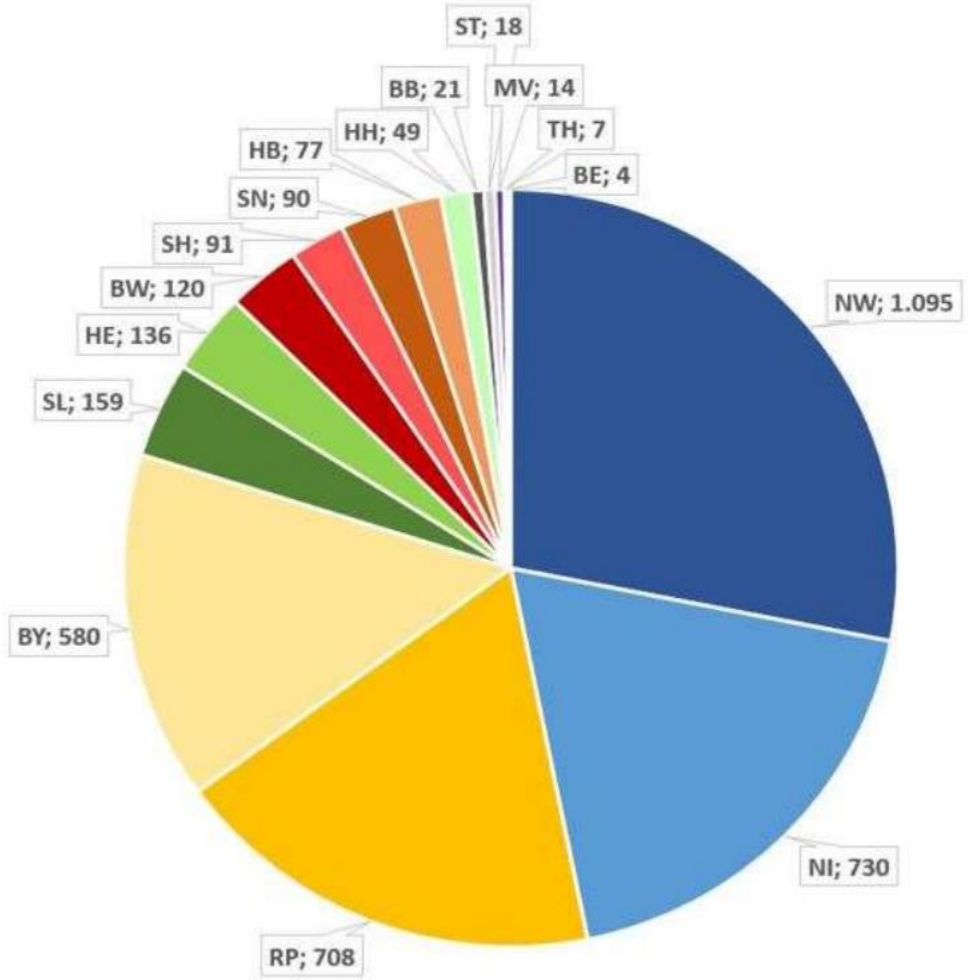


Different federal state-specific PAH limit values (mg/kg dm) for the classification of road waste containing tar as hazardous waste
Source: State Office for the Environment, Agriculture and Waste Management, Free State of Saxony publcation series, issue 7/2018

Waste code 170301* = bitumen mixtures containing coal tar

Source: LAGA, principles for dealing with tar-containing asphalt, Stand: 21.05.2024

Occurence of tar-containing asphalt in the federal states per year



In **Lower Saxony**, between approx. 550.000 t (2021) and 730.000 t (2019) of tar/pitch-containing material with the waste code 170301* is generated annually.

⇒ RIA.H recovers approx. 120,000 t/a of high quality rock by thermal treatment

Input into waste disposal facilities, waste code 170301* [1.000 tons] in 2019, LAGA, dealing with tar-containing asphalt

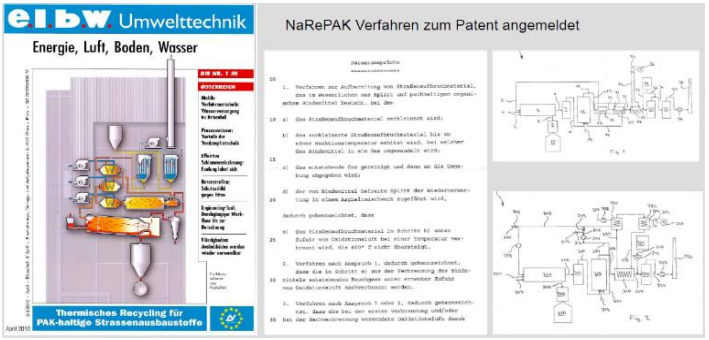
The basis for our treatment process:

NaRePAK-Process with the patent of EISENMANN

Nachaltiges Recycling von PAK-haltigem Strassenaufbruch

Sustainable recycling of tar-containing removed asphalt

- Efficient thermal process with energy recovery
- Minimizing the thermal load on the rocks in the asphalt, T_{max} < 630°C
- No pyrolysis, working with excess oxygen



Our Solution (1)

Adaption to needs and region:

- Decentralized low-temperature recycling plants with capacities of 120.000 - 150.000 t/year
- Temperature: 570 - 600°C (no strong stress on the rock aggregates)
- Functions almost autothermally, only gas backup firing required
- After processing, the original natural materials – gravel, grit, sand and silt – are available again and can be used again
- The heat destroys the organic substances and so the rock is gently recovered (PAH << 3 mg/kg after treatment
- Cleaning of exhaust gases using afterburning and filter systems

Our solution (2)

- Use of almost all resulting mineral components and waste heate:
  - About cyclone separation of fillers (for concrete, asphalt)
  - Classic rock aggregates without adhesions
  - Use of waste heat, most effectively by using in adjacent 24/7 industrial processes as provided at the IVH site
  - Imediate proximity to the consumer of the recovered raw materials. Users get back regionally known and used rock compositions and mixtures. In other words, material that they already know and can handle with.

Further development of the process concept (1):

RiA

Rohstoffrückgewinnung durch innovative Asphaltaufbereitung

Raw material recovery by innovative Asphalt processing

- Reduction of the thermal load on the mineral mixture, temperature now at approx. 570 - 600°C
- Optimization of flue gas cleaning, clean gas values according to the amended 17th BImSchV are adhered to
- Development of several location-adapted heat utilization concepts for the resulting waste heat
- Knitted black/white separation in the acceptance ares
- Gentle digestion of the input material before thermal treatment

Further development of the process concept (2):

RiA

Rohstoffrückgewinnung durch innovative Asphaltaufbereitung

Raw material recovery by innovative Asphalt processing

- Direct classification of the output stream after thermal treatment
- Reclaimed rock aggregates has been proven by the FGSV (Research Society for Road Construction and Traffic) research project No. 2/22 to the suitable for higher-quality raw material use: In asphalt mixtures and concrete production
- No formation of CO_2 from minerals (no destabilization of carbonates)

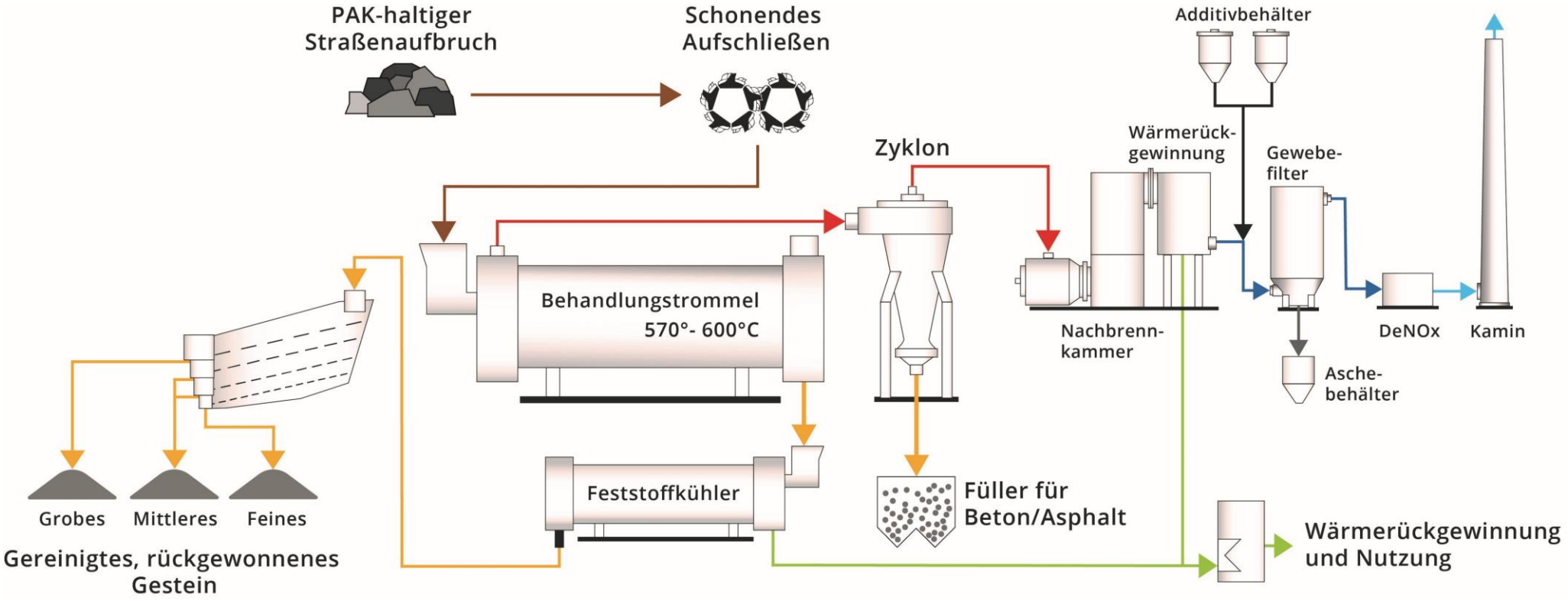
=> Based on these results, it is ensured that the project is technically possible and feasible and that the cleaned aggregates are marketable.

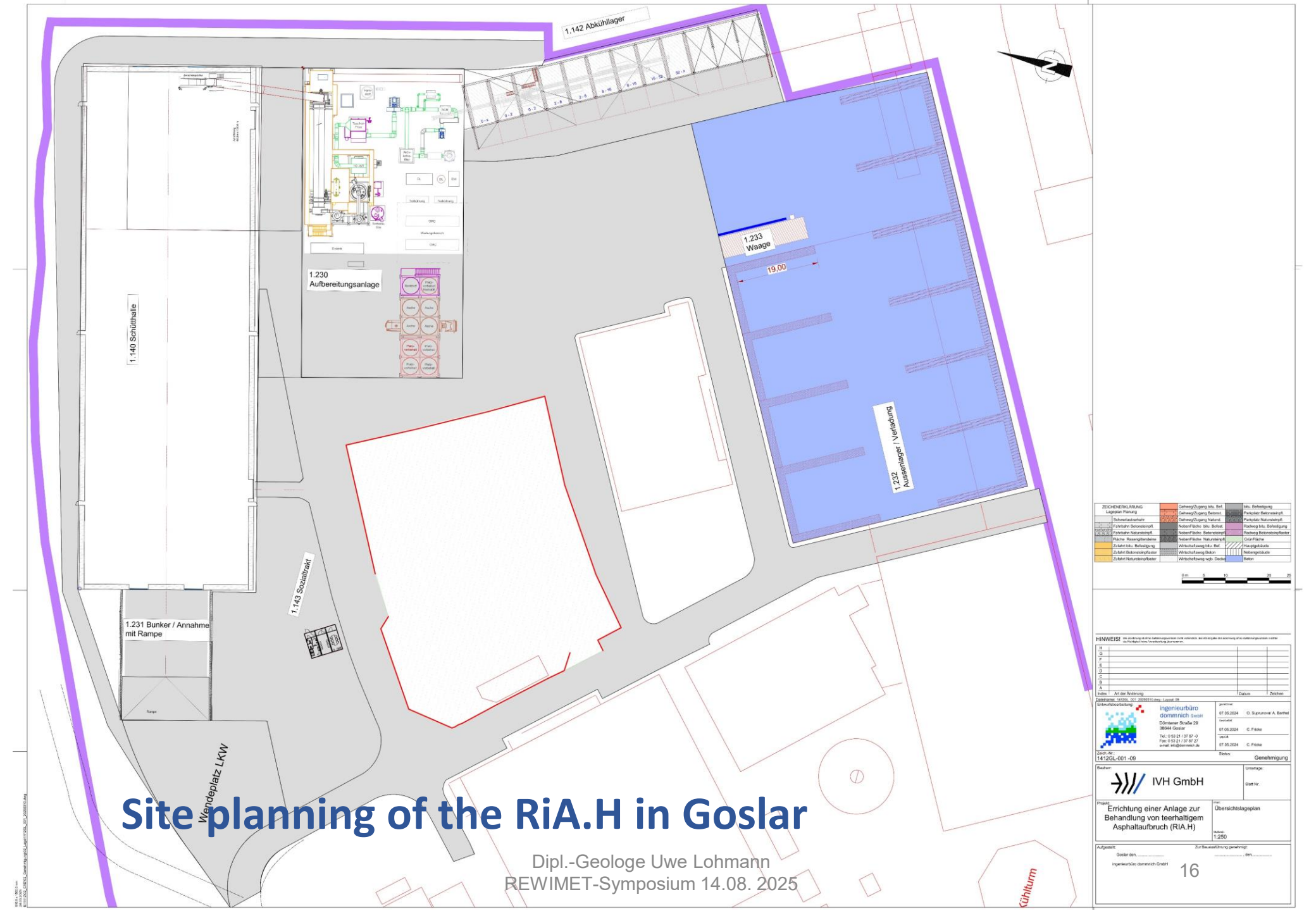
Framework data of the planned plant in Goslar

Delivery, storage, mechanical pretreatment, thermal treatment of tar-containing asphalt and postclassification of the cleaned aggregates

Waste used:	17 03 01* bitumen mixtures containing tar 17 03 02 bitumen mixtures except 17 03 01*
Stockpilling input:	Storage in a closed hall with a capacity of approx. 20.000 t
Mecanical pretreatment:	Acceptance, crushing and pre-screening of the asphalt in a closed hall, approx. ca. 600 - 700 t/d (max. 4.000 h/a)
Therminal treatment:	approx. 415 t/d bzw. 135.000 t/a (ca. 7.800 h/a)
Space requirements:	approx. 20.000 m^2
Investment volume:	Thermal processing plant including infrastructure: Approx. 30 Mio. €

Schematic structure of the system





Site planning of the RiA.H in Goslar

Dipl.-Geologe Uwe Lohmann
REWIMET-Symposium 14.08. 2025

Status of the approval process at IVH

- April 2024: Submission of the permit application according to BImSchG for the IVH location
- July 2024: KFW`s commitment to funding as part of the German Federal Environment Ministry`s environmentel innovation programm
- März 2025: Public display of the application documents
- Until the end of April 2025: Possibility of submitting objections (5 objectors) ha
- 17th/18th June 2025: Discussion date – permit is expected by October

High quality reuse of the cleaned aggregates in asphalt

- According to §6 KrWG, waste hierarchy, (1) measures for prevention and waste management [...] the RiA process is to be classified as preparation for reuse.

- According to the final draft of TL Asphalt-StB 25 (as of February 28, 2025) the use of recovered aggregates from thermal treatment of road construction materials containing tar or pitch in asphalt mix for base courses is possible.

Highh quality reuse of the cleaned aggregates in concrete

In addition to mortar tests, concrete tests with the sand fraction <2mm are currently underway at the F.A. finger Institute for Building Materials science at the Bauhaus University Weimar

- Fresh concrete properties
- Compressive strenth after 2, 7 and 28 days
- Frost and freeze-deicing-salt test
- Investigations carried out earlier by an accredited laboratory (Dr. Moll, 2021) showed that both the grain size and the filler from the RiA process are generally suitable for concrete production

Summary:

- ✓ Allmost 100 % of the aggregate from regional tar-containing asphalt is recovered
- ✓ Valuable raw materials are returned to the value chain
- ✓ Major contribution to sustainability and decarbonization and thus to achieving European environmental and climate goals
- ✓ No CO_2 generation from the thermal treatment of the minerals
- ✓ State-of-the-art technology with high german quality standards
- ✓ Synergetic addition to existing recycling plants and optimal use of the industrial area
- ✓ Thermal energy at a level of approx. 18,000 MWh/a is available for external use or use in other industrial plants in site

Innovative. Efficient. Ressource-saving.

https://www.ria-h.de

Contact: Uwe.Lohmann@i-v-h.de