PARTICIPATION OF SCHWENK GROUP IN CCUS VALUE CHAIN

Evita Gosa | SCHWENK

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SCHWENK

SCHWENK BUILDING MATERIALS GROUP

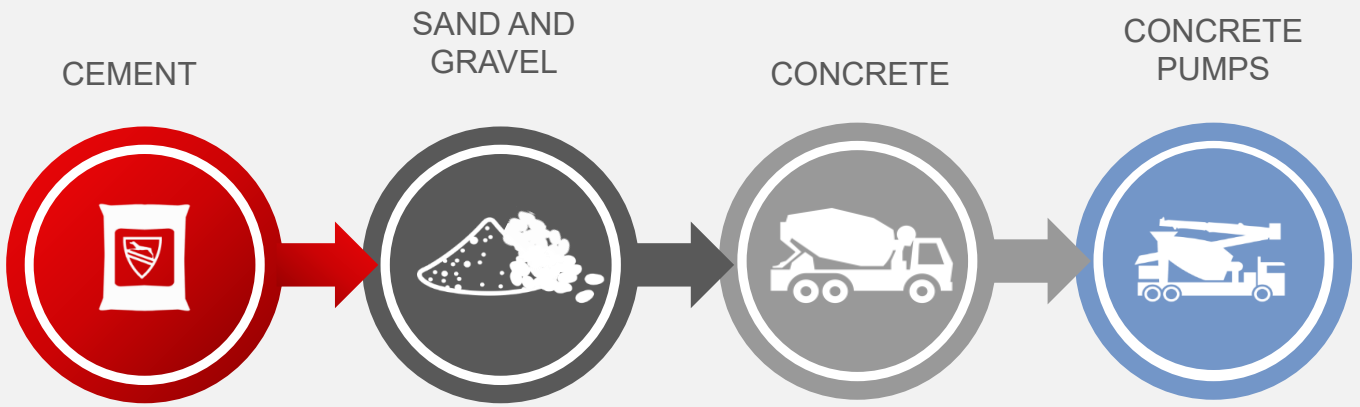
Founded by Eduard Schwenk in 1847, Ulm, Germany

One of the oldest family-owned building materials producers

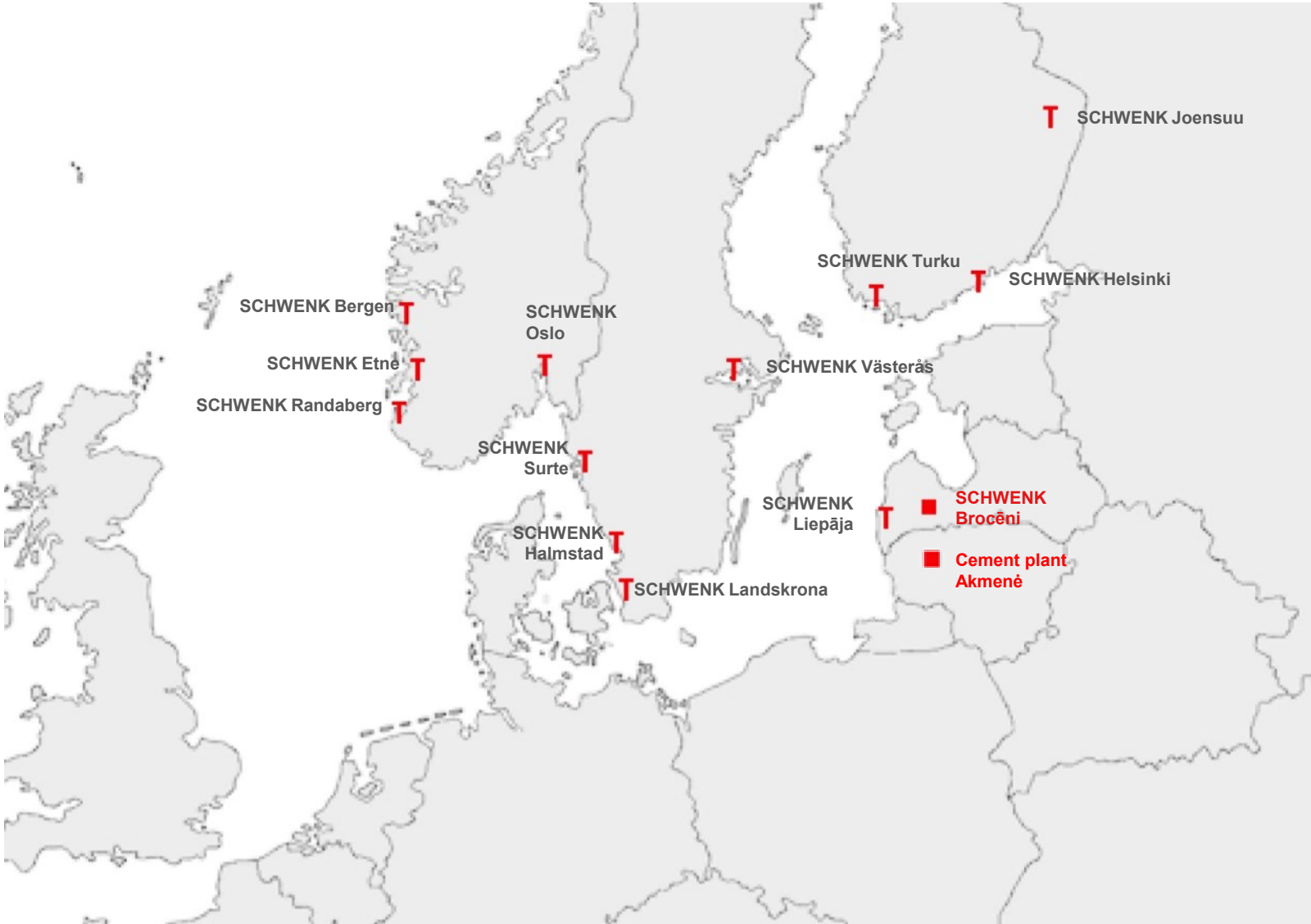
Employees worldwide ~ 4000

Leader in sustainability and innovation

Since 2019 – in Northern Europe



SCHWENK NORTHERN EUROPE



BROCĒNI CEMENT PLANT - ONE OF THE MOST MODERN AND GREENEST IN EUROPE (AMONG TOP 3% IN CO2/T CLINKER)

PRODUCTION OF CEMENT AND CONCRETE

clay

+

limestone

+

irone ore

+

sand

fuels:
alternative fuels (AF)
+ natural gas, coal

> 1500°C

clinker

+

other materials, slag, fly ash, etc.

+

gypsum or anhydrite

cement

+

sand

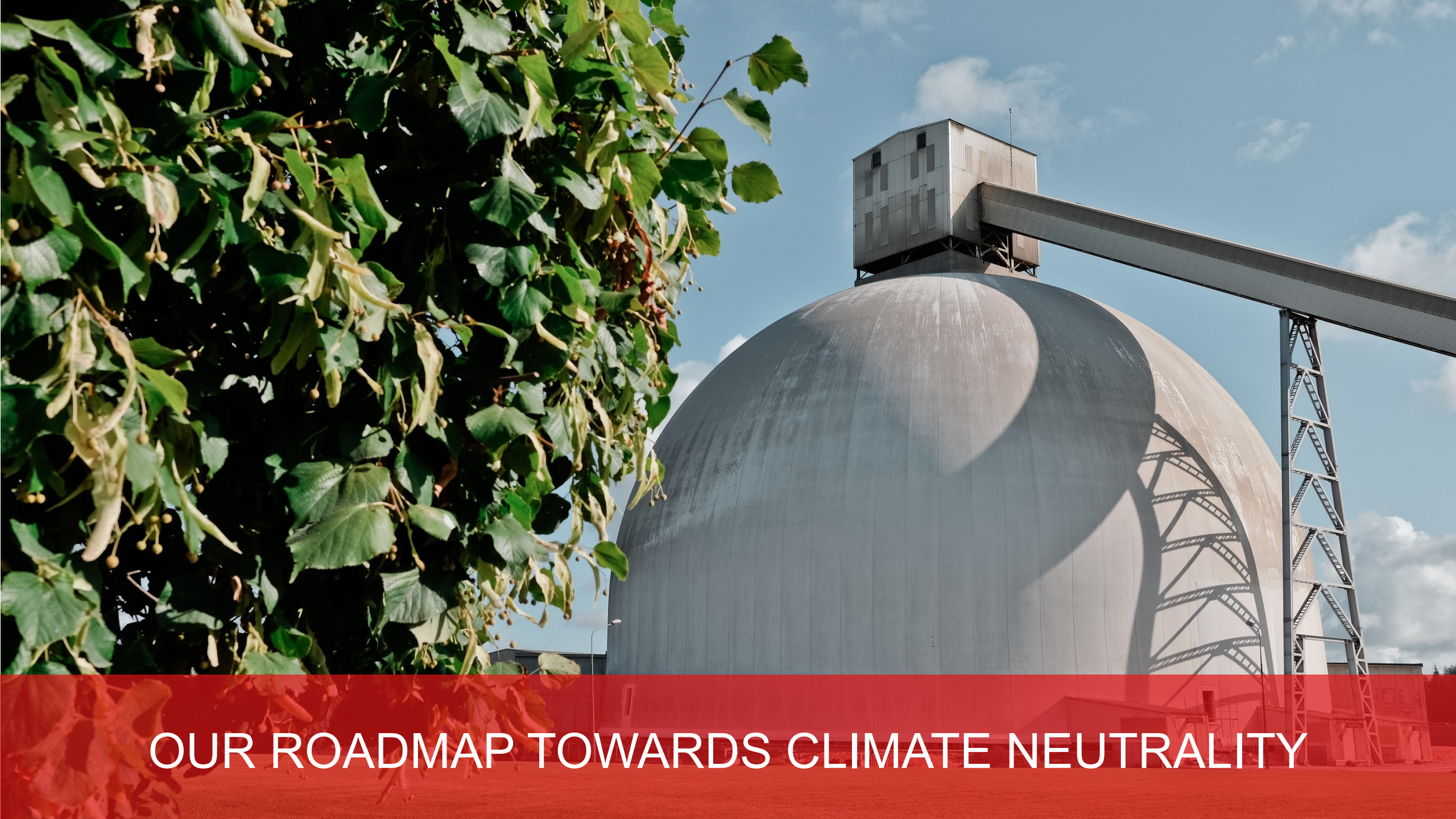
+

gravel

+

water

concrete



OUR ROADMAP TOWARDS CLIMATE NEUTRALITY

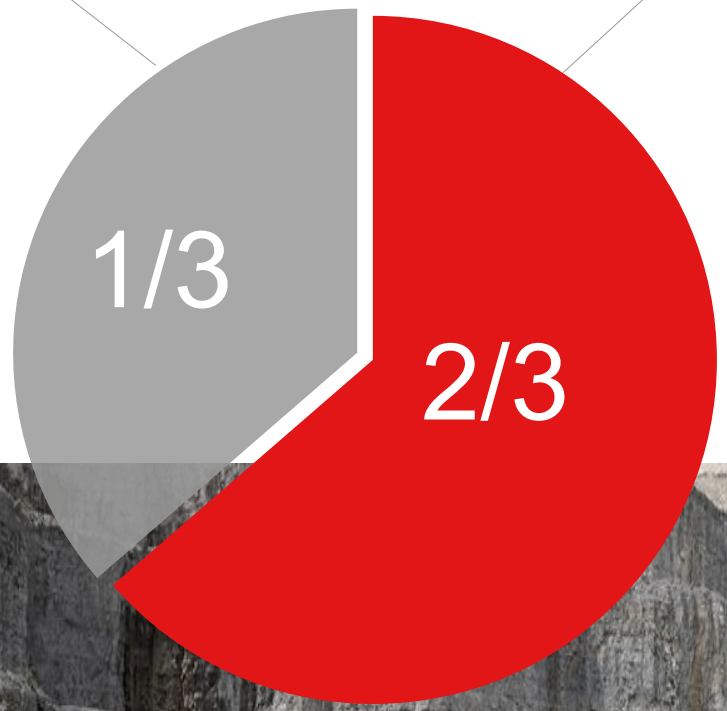
EMISSIONS IN CEMENT PRODUCTION

WHERE DOES CO_2 ORIGINATE IN OUR PRODUCTION PROCESS?

FUEL DETERMINED EMISSIONS

Emerge through use of fossil and alternative fuels in rotary kiln.

The further reduction of these emissions is our first priority.



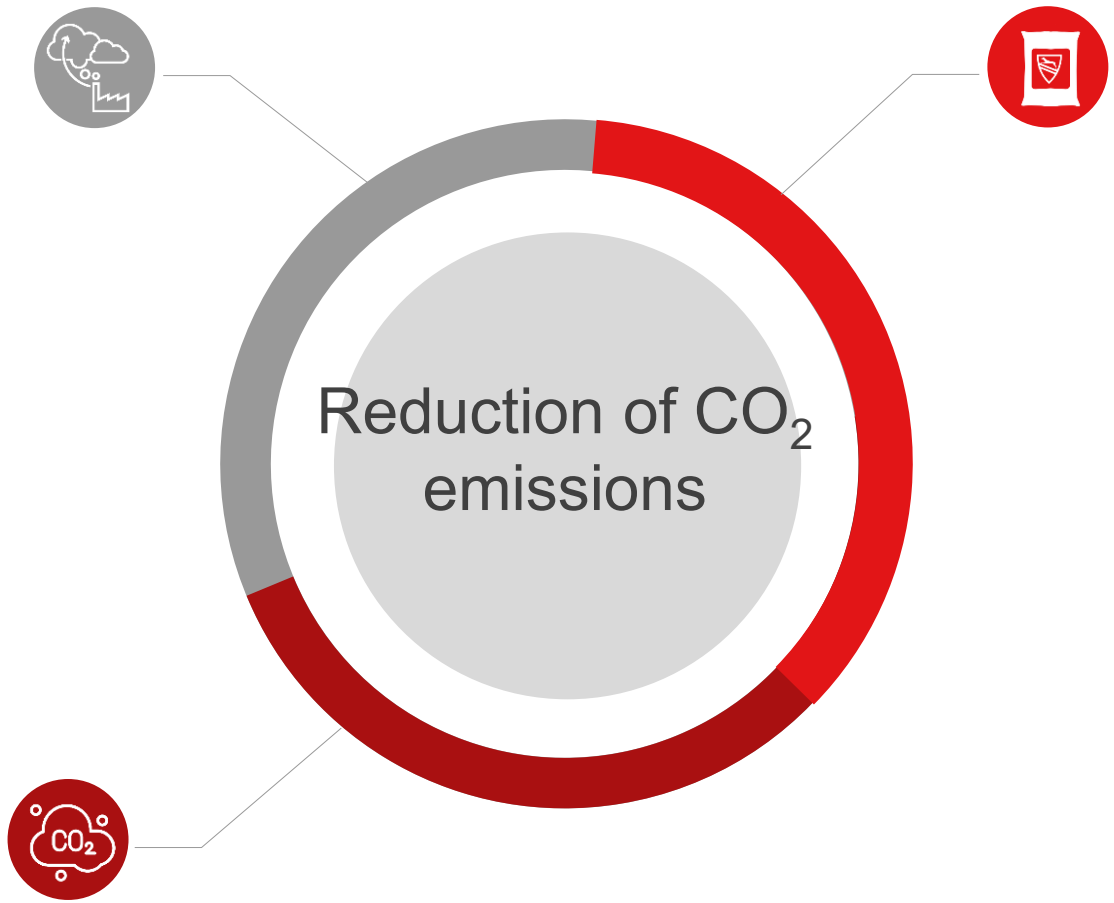
RAW MATERIAL DETERMINED EMISSIONS

Bound in limestone and are released in burning processes

The possibility to reduce these emissions is rather limited.

OUR GOALS FOR REDUCING CO_2 EMISSIONS AT THE BROCĒNI PLANT (AKMENE PLANT)

GOAL 1
Reduce the average CO_2 emission factor of the clinker production by 50 kg/t until 2025 for saving 61K t CO_2 annually.



GOAL 2
Reduce the average clinker factor (% clinker in cement) until 2025 by 10% to the level that would save 122K t of clinker and thus – 76K t CO_2 annually.

GOAL 3
By 2030 – the first CO_2 neutral cement plant in the group.
Until 2035 - also in the Baltics.

CCSU VALUE CHAIN: SCHWENK POSITION

CC IS RESEARCHED BOTH IN LATVIA AND AT THE GROUP LEVEL

- **CC: SCHWENK Broceni cement plant completed participation in Genesis**
  - A Horizon 2020 project: https://www.genesis-h2020.eu
  - Containerized «proof of concept» plant for membrane-based CO_2 separation at industrial conditions
  - Despite pandemic-related delays, successful CO_2 separation from post-kiln gas flow (though not to e.g. 90% purity yet)
  - Process now to be made more energy efficient and upscaled - partners reviewing possibilities
  - The project may be extended; awaiting project partners' suggestions

- **CC: SCHWENK Mergelstetten oxyfuel process plant project - on track**
  - 2022: design, permitting, first construction works
  - CI4C – Cement Innovation for Climate project, research company formed in 2019
    - Four cement producers: Buzzi Unicem, HeidelbergCement, SCHWENK Zement and Vicat
    - ThyssenKrupp Industrial Solutions' Polysius division is the technical partner
    - SCHWENK Mergelstetten plant selected as the project site
  - Less than 10% of Broceni plant's annual capacity: industrial scale, but not a full plant
  - Learnings to be used for decision if and how to build a full-scale oxyfuel plant
  - If successful, the technology can be copied to the Baltics
  - Potentially the least energy-intensive of the CC methods for the cement industry
  - Still requires substantial amounts of extra fuel and (renewable) electricity
  - Potential synergies with green H_2 production: oxyfuel process can use the resulting O_2

https://www.youtube.com/watch?v=jsvBfl18RNk

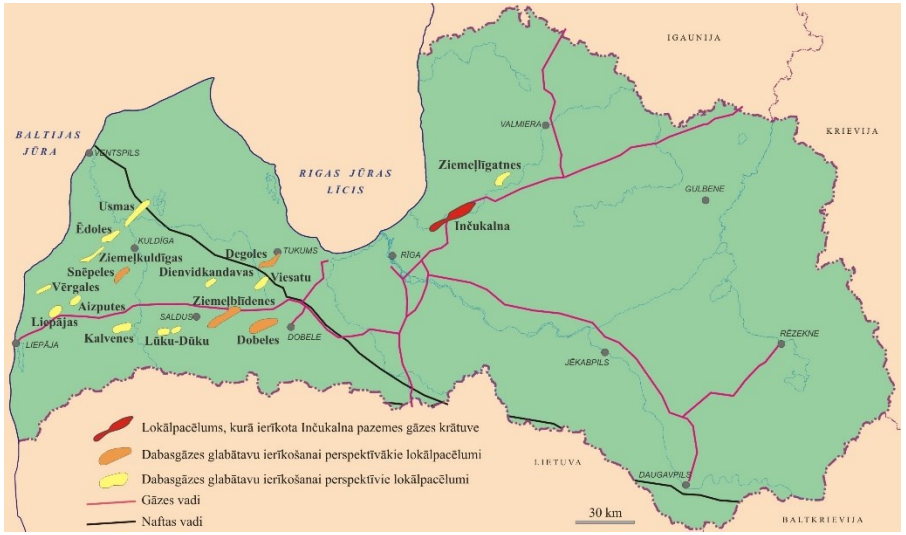
CS: LATVIA'S AND REGIONAL GEOLOGICAL RESOURCES AND REGULATIONS

FURTHER INVESTIGATION AND VALIDATION REQUIRED

- **CS: Draft Climate Law now includes CCSU provisions**

- **CS: Contact with geological research specialists to check indicative work plans for further geological research**
  - Dobele and North Blidene reservoirs primarily
    - Closest to CEM plant
    - 105 Mt Dobele, 142 Mt North-Blīdene optimistic capacity; also Blīdene with 112 Mt
  - Dobele has last been researched in 2009-2010 for natural gas storage potential assessment
    - But only based on revisiting and logging existing USSR-time wells
    - Prior research of USSR-time wells promising, but the reservoirs need further validation via primary research: both logging of existing wells and expanding the wells network
    - Existing wells may actually be a risk for the future use of a geological structure
  - The aim is to confirm a **road-map with cost indications** to make recommendations to the relevant authorities regarding National Climate and Energy Plan 2021-2030 linked R&D activities and respective funding instruments

- **Offshore storage**
  - Also a potential interim solution until the CU industry matures
  - In discussion with Klaipėdos Nafta and relevant partners to consider this value chain
  - Similar energy-intensity and cost considerations as for CC



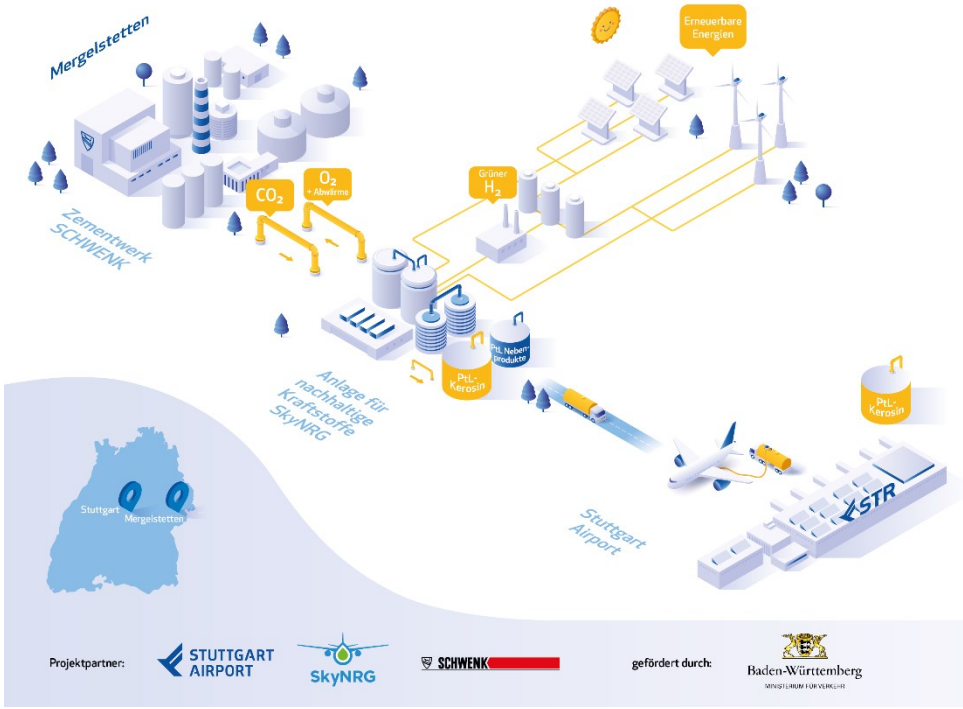
Source: LVGMC, https://videscentrs.lvgmc.lv/lapas/strukturas-dabasgazes-un-co2-uzglabasanai

CU: SCHWENK POSITION

FOCUSED ON CC; SUPPORT CU RESEARCH AND DEPLOYMENT

- **CU medium term: Processing into synthetic fuels**
  - Baden-Württemberg federal state and project consortium, including SCHWENK, support a feasibility study regarding the production of synthetic kerosene from cement industry carbon emissions
  - https://www.schwenk.de/baden-wuerttemberg-foerdert-die-studie-zur-herstellung-und-zum-einsatz-von-synthetischem-kerosin-auf-basis-erneuerbarer-energien/
  - Aviation e-kerosene / SAF targets raised by EC's mid-2022 «Fit for 55» package to 2% by 2025, 37% by 2040
  - https://www.europarl.europa.eu/news/en/press-room/20220627IPR33913/fit-for-55-transport-meps-set-ambitious-targets-for-greener-aviation-fuels

- **CU short term: Suggestion to also research and expand current uses of CO_2**
  - Need to check the CO_2 «market» in the Baltics
  - «Low-hanging fruit» – where first captured CO_2 volumes can be used
    - These may be in semi-industrial scale, e.g. a few thousand t captured per month
    - Some industrial producers already now have excess CO_2 to offer
    - Could serve as first steps to establish the new CO_2 supply chain, separately from traditional production methods
      - Technical questions: purification, testing
      - Transportation and related costs
      - Verification of captured and utilized amounts, integration into the Emissions Trading System
    - Are there industries where CO_2 use can be quickly started or uspcaled
    - E.g. Broceni cement plant uses CO_2 in the coal grinding and storage facility's fire safety system; needs ~100 t / year
  - This could be a market research study
    - Interviews with existing and potential consumer industries
    - Demand estimates
    - Regulatory, transportation, practical hurdles and bottlenecks
  - Need to start somewhere before economically viable processing into synthetic fuels becomes standard industrial practice



THANK YOU!

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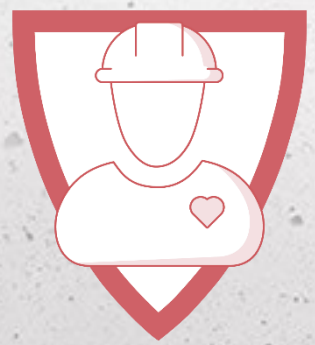

HEALTH & SAFETY

GROWTH

COLLABORATION

RESPONSIBILITY