CO_2 volume roadmap

CETP CO2RR – Deliverable 1.2 [*interim*]

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Context and introduction

Context

Background

- The Carbon Rhine Route project (CO2RR) aims to establish the first commercial, multi-modal CO_2 transport value chain in Europe, operational by 2026.
- Initial focus on biogenic CO_2 emitters across Switzerland, France and Germany to achieve negative emissions and aggregate capture volumes.

The CO2 roadmap concept

- Objective: Enable the sequestration of 1 million tCO_2 by 2030.
- Focused on clustering emitters for economies of scale and operational efficiency.
- Addresses financial, logistical, and regulatory bottlenecks for small to medium emitters (biogas, waste-to-energy, biomass).
- Refer to ***Deliverable 1.1****: Emitter clusters structure* for details on the cluster concept, opportunities, challenges and progress.

Introduction

Purpose

- This deliverable provides an overview of progress in discussions with CO2 emitters.
- It aims to outline the roadmap for achieving 1 million tCO_2 sequestration by 2030, including commitment milestones.

Key points

- There has been active outreach to emitters across Switzerland, France and Germany.
- Identified emitters represent emissions totalling 4.05 million tCO_2 per year. However, the status of discussions with each vary from confirmed projects to identified emitters not yet being engaged by the consortium.
- The project has, to date, confirmed a single BECCS project in Switzerland and two in France. While these are small-scale, they represent first-of-a-kind projects and the consortium is actively leveraging these to engage other emitters.
- Challenges related to the clustering approach include:
    a. Alignment of timelines.
    b. Regional and contextual differences.
    c. Critical mass and scalability.

Status of discussions with emitters

Swiss and German emitters (1/2)

Type of plant	Location	CO2 origin	CO2 emissions	Status of discussions
Biomethane	Aargau canton, CH	Biogenic	< 15,000	Confirmed
Biomethane	Aargau canton, CH	Biogenic	< 15,000	Confirmed
Waste-to-energy	Basel-Stadt canton, CH	Biogenic & fossil	200–400	Ongoing discussion
Biomass cogeneration	Basel-Stadt canton, CH	Biogenic	100–200	Ongoing discussion
Heat	Basel-Stadt canton, CH	Fossil	15–50	Ongoing discussion
Heat	Basel-Stadt canton, CH	Fossil	15–50	Ongoing discussion
Waste-to-energy	Glarus canton, CH	Biogenic & fossil	100–200	Ongoing discussion
Cement	Aargau canton, CH	Fossil	> 400	Ongoing discussion
Waste-to-energy	Zürich canton, CH	Biogenic & fossil	> 400	Ongoing discussion
Waste-to-energy	Graubünden canton, CH	Biogenic & fossil + fossil	100–200	Ongoing discussion
Biomass cogeneration	Graubünden canton, CH	Biogenic	100–200	Ongoing discussion
Biomass cogeneration	Aargau canton, CH	Biogenic	15–50	Ongoing discussion
Biomass cogeneration	St. Gallen canton, CH	Biogenic	< 15	Ongoing discussion
Biomass cogeneration	Zürich canton, CH	Biogenic	15–50	Ongoing discussion
Cement	Graubünden canton, CH	Fossil	> 400	Initial contact

Note: Emitters' data have been anonymised for the purpose of this deliverable.

Swiss and German emitters (2/2)

Type of plant	Location	CO2 origin	CO2 emissions	Status of discussions
Sewage incineration	Basel-Stadt canton, CH	Biogenic & fossil	15–50	Prospective
Waste-to-energy	Aargau canton, CH	Biogenic & fossil	100–200	Prospective
Industry	Baden-Württemberg, DE	Fossil	100–200	Prospective
Industry	Basel-Landschaft canton, CH	Fossil	100–200	Prospective
Sewage incineration	Basel-Landschaft canton, CH	Biogenic & fossil	< 15	Prospective
Biomethane	Basel-Landschaft canton, CH	Biogenic	< 15	Prospective
Cement	Aargau canton, CH	Fossil	> 400	Prospective
Industry	Aargau canton, CH	Fossil	50–100	Prospective
Waste-to-energy	Aargau canton, CH	Biogenic & fossil	100–200	Prospective

Note: Emitters' data have been anonymised for the purpose of this deliverable.

French emitters

Type of plant	Location	CO2 origin	CO2 emissions	Status of discussions
Biomethane	Meurthe-et-Moselle, FR	Biogenic	< 15,000	Confirmed
Biomethane	Loiret, FR	Biogenic	< 15,000	Confirmed
Biomethane	Drôme, FR	Biogenic	15–50	Ongoing discussion
Biomethane	Tarn, FR	Biogenic	< 15	Ongoing discussion
Biomethane	Indre-et-Loire, FR	Biogenic	< 15	Ongoing discussion
Industry	Gard, FR	Biogenic	15–50	Ongoing discussion
Biomass cogeneration	Oise, FR	Biogenic	< 15	Ongoing discussion
Biomass cogeneration	Drôme, FR	Biogenic	< 15	Ongoing discussion
Biomass cogeneration	Drôme, FR	Biogenic	100–200	Ongoing discussion
Biomass cogeneration	Allier, FR	Biogenic	100–200	Ongoing discussion
Waste-to-energy	Vaucluse, FR	Biogenic & fossil	100–200	Ongoing discussion
Biomethane	Seine-et-Marne, FR	Biogenic	< 15	Initial contact

Note: Emitters' data have been anonymised for the purpose of this deliverable.

Next steps

Reaching 1 million tCO_2: Next steps (1/2)

Expand emitter engagement

- Current progress: emitters representing 4.07 million tCO_2 identified, but engagement is at various stages, and 4 projects confirmed.
- Next steps:
  - Prioritise high-volume emitters to rapidly scale clusters.
  - Maintain and grow an active pipeline of prospective emitters.

Differentiated strategies by region

- Switzerland:
  - Focus on established clusters (e.g. Zurich) with strong policy support and existing feasibility studies.
  - Leverage smaller-scale pilot projects to test scalable models.
- France:
  - Build a cohesive network of biomethane and biomass emitters.
  - Address fragmented emitters through feasibility studies and mini-clusters.

Reaching 1 million tCO_2: Next steps (2/2)

Cluster and individual focus

- Cluster development: Accelerate shared infrastructure planning and other emerging clusters through more engagement with emitters and service providers. Ensure transport and storage solutions are scaled to handle aggregated volumes.
- Individual emitters: Support standalone projects to serve as models for future expansion.

Roadmap to 1 million tCO_2 per year

- Leveraging prospective emitters and clustering for economies of scale, but adapt to local needs and timelines.
- Establish key milestones, e.g.:
    - By 2026: Operationalise transport and storage infrastructure for first clusters/ emitters, and secure commitments from emitters totalling 200,000 tCO_2 per year.
    - By 2030: Expand individual projects and cluster to reach 1 million tCO_2.