



# WHAT WE NEED TO UNLOCK BIOMASS CARBON REMOVAL AND STORAGE IN SWITZERLAND

March 2023



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The views and suggestions expressed in this paper are those of the authors and do not necessarily reflect the positions of individual reviewers or their respective organisations.

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## **Acronyms**

BiCRS    Biomass carbon removal and storage

CCS      Carbon capture and storage

CDR      Carbon dioxide removal



# Introduction

This paper is a follow-up to a conversation with members of the Swiss Federal Office for the Environment in January 2023. We start by answering the question of what Biomass Carbon Removal and Storage (BiCRS) is and why it matters; this is followed by an outline of the actions needed to unlock BiCRS in Switzerland, with references to resources from other thought leaders on carbon dioxide removal (CDR). After this, we assess the following two prominent barriers to scaling BiCRS in Switzerland.

- There is currently no liquid market in place for CDR: missing revenue models, high costs and uncovered risks prevent emitters from engaging in projects.
- Connecting emitters with available long-term storage sites is the largest cost driver: current solutions are expensive for pioneering projects and the network plans do not enable the transportation capacity at the required scale post-2030.

We then provide suggestions on how to overcome these barriers in the short and medium term. We hope that sharing this paper with members of the Federal Office for the Environment and the wider BiCRS ecosystem will be a starting point in discussing and implementing state measures.



# What is BiCRS and why does it matter?

While deep emission reductions should always be prioritised within any net-zero strategy, CDR is also an essential element. This holds true for the Swiss Climate Strategy.<sup>1</sup> The recently published “State of CDR” assessment highlights the urgent need for CDR : “The next decade is crucial for novel CDR: Failure to create momentum in this formative phase will contribute to a widening gap in 2050 and beyond.”<sup>2</sup>

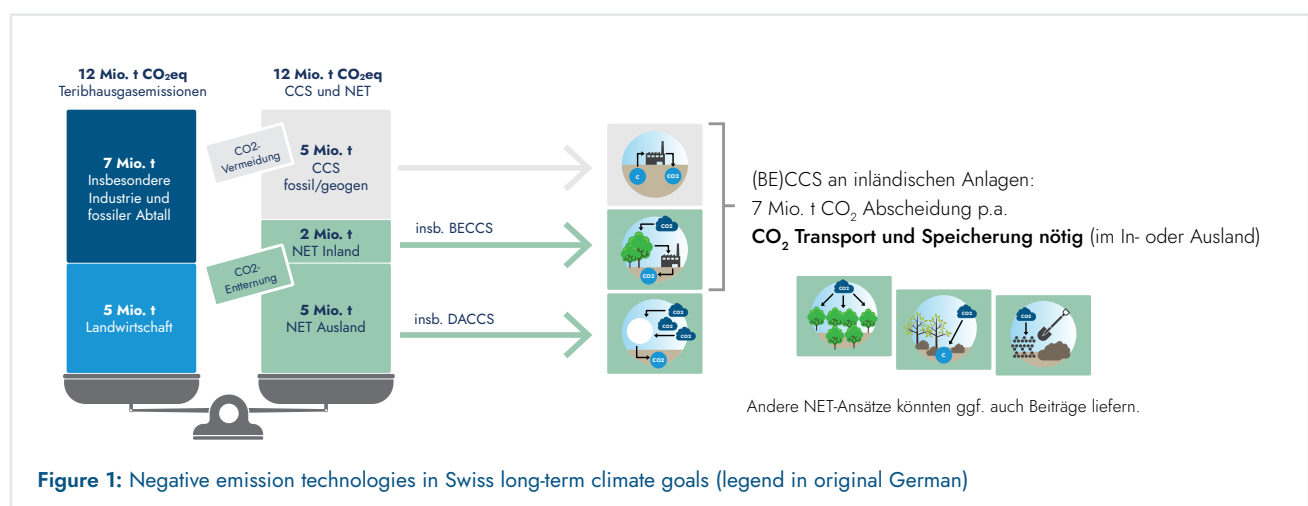
BiCRS is a CDR solution involving the capture of carbon emissions from organic materials and their permanent storage either underground or in durable products.<sup>3</sup> BiCRS has the potential to contribute immediately to national climate change mitigation – the technology is ready to be deployed and there are a large number of suitable local point sources.

In May 2022, the Swiss government published its expectations for the development of BiCRS at waste-to-energy plants, biomass plants and biogas plants, which would be established with the goal of removing 2 million tonnes of CO<sub>2</sub> per year by 2050<sup>4</sup> (see Figure 1 from the original report).

Encouraging measures have been taken, such as carbon capture and storage (CCS) projects being made eligible as compensation projects<sup>5</sup>, the agreement between the confederation and the Swiss association of waste-to-energy plant operators<sup>6</sup> (VBSA [Verband der Betreiber Schweizerischer Abfallverwertungsanlagen]), and Klimarappen Foundation’s dedicated funding for CDR<sup>7</sup>.

However, significant barriers remain, and under the current market conditions, a BiCRS industry is unlikely to emerge in the short term. In addition to the missed opportunity to fast-track climate change mitigation, the current situation prevents Switzerland from positioning itself as an international climate leader. Switzerland risks missing out on securing a stake in this future one-trillion-dollar industry<sup>8</sup>.

Countries such as Denmark<sup>9</sup>, the Netherlands<sup>10</sup>, Norway<sup>11</sup>, Sweden<sup>12</sup>, the UK<sup>13</sup> and the USA<sup>14</sup> are actively putting fast-track regulations in place (mostly temporary subsidies) to accelerate BiCRS and CCS development. Many countries, including some of Switzerland’s neighbours, are working on transport solutions, such as pipeline infrastructure. Several concrete plans are being pursued in Germany<sup>15</sup>; in France, the government has until June to come up with a roadmap, with up to EUR 10 billion of public support for decarbonisation projects available<sup>16</sup>. While being open to the topic of carbon removals, we believe Switzerland can do more to help unlock the BiCRS market. **The public sector needs to step up to create an enabling environment, including a regulatory framework.** In later parts of this paper, we offer suggestions for the short and medium term.



<sup>1</sup> Langfristige Klimastrategie 2050, January 2021

<sup>2</sup> The State of CDR, January 2023

<sup>3</sup> BECCS vs BiCRS, CounterAct

<sup>4</sup> Bericht zum Ausbau von Negativemissionstechnologien, Mai 2022

<sup>5</sup> Kompensationsprojekte in der Schweiz, 2022

<sup>6</sup> Vereinbarung mit Kehrichtverbrennungsanlagen, March 2022

<sup>7</sup> Ausschreibung für CCUS/NET Projekte, 2022

<sup>8</sup> WEF panel in 2022

<sup>9</sup> Denmark bets on North Sea carbon capture to hit climate goals, Reuters December 2022

<sup>10</sup> Carbon Contracts for Difference: The Netherlands, February 2023

<sup>11</sup> Norwegian government funds full-scale CCS project, The Chemical Engineer September 2020

<sup>12</sup> Toward the effective and fair funding of CO<sub>2</sub> removal technologies, M. Honegger, February 2023

<sup>13</sup> Business Models for Engineered Greenhouse Gas Removals, October 2022

<sup>14</sup> The U.S. Inflation Reduction Act of 2022, August 2022

<sup>15</sup> e.g. North Sea pipeline to transport CO<sub>2</sub> from Germany to storage sites in Norway, August 2022

<sup>16</sup> Devenir le leader des industries vertes, November 2022

# What is needed to unlock BiCRS

**In the absence of reliable business models, Swiss emitters at present have little incentive to start BiCRS projects. Under the current conditions, they face uncertain revenues, high costs and excessive risks regarding the offtake of captured CO<sub>2</sub>. Given these uncertainties, final investment decisions for capture facilities are highly unlikely.**

To lower the barriers, government intervention is a necessity. Short- and medium-term measures are required to fast-track early-movers in BiCRS. These measures should focus on creating market demand and lowering CDR production costs and risks. Therefore, both demand- and supply-side interventions should be put in place. The foundations for the development of a CO<sub>2</sub> pipeline to connect emitters with long-term storage sites should also be built now, in anticipation of the new Climate Law (which will be effective 2025 or later). Airfix recommends getting ahead of the curve by putting measures in place even before this Law comes into effect.

Implementing effective measures would demonstrate that CDR can actually contribute to climate targets as planned. This is particularly relevant to cities, regions or corporations with early net-zero targets (e.g. public administration in the City of Zurich by 2035<sup>17</sup>, Canton Basel-Stadt by 2037<sup>18</sup>). In addition, supporting BiCRS activities can catalyse the construction of infrastructure that will be used for CCS activities and internalise most of the climate-related external cost in sectors with hard-to-abate fossil fuel emissions. It would also strengthen Switzerland's international position as an industry and climate leader.

While research programmes supporting different CCS-related objectives are in place, such as DemoUpCARMA<sup>19</sup> or DeCIRRA<sup>20</sup>, the outlook on tangible projects in the 2020s is limited to:

- i) small-scale projects supported by the Klimarappen Foundation<sup>21</sup>;
- ii) a waste-to-energy project (100,000 tCO<sub>2</sub> per year) resulting from the agreement between the confederation and the VBSA<sup>22</sup>, which to date has no business plan; and
- iii) potentially small-scale projects supported by the voluntary carbon market. We are convinced that kick-starting high-complexity, medium-sized (over 50,000 tCO<sub>2</sub> per year) projects now is essential to create time for a learning curve, before large-scale projects can take off.

Excluding the time needed for permits, public referendums and votes, projects to set up carbon capture infrastructure already have long lead times of three to five years for planning and construction. **We therefore recommend starting now and implementing measures to unlock BiCRS sooner rather than later.**

<sup>17</sup> [Ein neues Klimaschutzziel für Zürich](#), Stadt-Zürich website

<sup>18</sup> [Basel auf dem Weg zu Netto-Null](#), November 2022

<sup>19</sup> [DemoUpCARMA](#) project website

<sup>20</sup> [DeCIRRA](#) project website

<sup>21</sup> [Ausschreibung für CC\(U\)S / NET Projekte](#), Stiftung Klimarappen

<sup>22</sup> [Vereinbarung mit Kehrichtverbrennungsanlagen](#), March 2022

# What others have to say (and why)

## Thought leaders and resources

### Vereinbarung mit Kehrlichtverbrennungsanlagen, March 2022

This agreement between the Swiss confederation and the VBSA establishes a roadmap for the commissioning of a plant that will capture 100,000 tCO<sub>2</sub> per year, starting by 2030 at the latest. According to the roadmap, financing for the capture plant must be outlined by 2025.

Vereinbarung

### CO<sub>2</sub> Abscheidung und Speicherung (CCS) und Negativemissionstechnologien (NET), May 2022

This report by the Swiss Confederation suggests that a Pioneer Phase be established until 2030 and that scaling CDR and CCS should be targeted thereafter. Overall, 12 million tCO<sub>2</sub> should be captured annually until 2050 using different technologies to contribute to the Swiss net-zero target. The suggested pathway points to the opportunities for economic development and research, should Switzerland take a leading role.

Bericht des Bundesrates

### Negativemissionstechnologien – notwendiges Standbein der Klimapolitik, Magazin "die umwelt", June 2022

While the opening of the Climeworks Orca plant (removing 4,000 tCO<sub>2</sub> per year) in September 2021 was an important milestone in the fight against climate change, Meuli quotes Swiss climate scientist Stocker's weaker expectations for the predicted scale of the plant. He points out that CDR is indispensable to reaching net-zero targets and recommends putting frameworks in place that allow for the socially- and environmentally-compatible expansion of CDR, nationally and internationally. Reto Burkhardt, head of the climate section at BAFU, added that a range of CDR solutions are needed to reach the scale required for achieving the amount of negative emissions needed.

Plea by Kaspar Meuli

### Voluntary Carbon Dioxide Removal Market in 2022, January 2023

This report shows key performance figures for the voluntary CDR market. In 2022, 592,969 tCO<sub>2</sub> were purchased – the largest individual commitment was Airbus' 400,000 tCO<sub>2</sub> from 1PointFive, a US subsidiary of the oil and gas company Occidental Petroleum. Excluding the largest deal, the market grew by 106% compared to the previous year. BiCRS projects accounted for 5% of the market, or approximately 30,000 tCO<sub>2</sub>.

VCM in 2022

# Barriers and opportunities: what is needed to scale BiCRS

## Issue 1:

**There is currently no liquid market in place for CDR: missing revenue models, high costs and uncovered risks prevent emitters from engaging in projects.**

While emitters are willing to engage in CDR projects, a business model that allows emitters to account for the incurred cost and risk of doing so is missing. Currently, the quantities of permanent carbon removal credits sold in the voluntary carbon market are insignificant compared to those needed to enable final investment decisions by the first medium-scale projects. A typical requirement for an equity investor to invest in a project is a secured revenue model over the lifetime period of an asset (in the case of a capture plant, this is 10+ years).

BiCRS projects generate carbon dioxide removals (CDRs) through the capture and permanent storage of biogenic CO<sub>2</sub> emissions. This is the **product** for which a new market is needed. This product is different from past market build-ups such as solar or wind energy as it does not create any obvious tangible asset for the consumer except for climate change mitigation, removing carbon from the atmosphere.

**CDR markets** can be either voluntary or compliance in nature:

- **A voluntary market** relies on voluntary carbon credit purchases by willing corporate buyers that decide to contribute to climate change mitigation using CDR certificates. Due to the voluntary nature of this nascent market, it is highly challenging to achieve investment security, even for medium-scale projects. The current voluntary market for removals is focused on nature-based and community solutions, and relies on low-price outlay spot transactions (CHF <20 per tCO<sub>2</sub>). A climate-relevant voluntary market for technical CDR would need to allow for high quantity, high price per tonne (CHF >200 per tCO<sub>2</sub>) certificates and long-term offtake contracts.
- **A compliance market** relies on public regulation which obliges consumers or operators to pay for the service of CCS in a biogenic plant. Options for waste-to-energy plants may include increasing fees for waste treatment or introducing an anticipated fee for plastics at the point of purchase, with the latter hardly being noticeable to consumers. Similar mechanisms can be designed for biogas and biomass plants. Another option could be to require certain emitters to offset residual emissions after reductions by sourcing CDR certificates. While this depends on the requisite regulation being put in place, sourcing could be done through the voluntary market or through the compensation mechanism under the Swiss Federal Office for the Environment. A paper by the UK Department for Business, Energy and Industrial Strategy refers to this as a “takeback obligation”.<sup>23</sup>

**The minimal cost of achieving CDR is EUR 490 per tonne of sequestered CO<sub>2</sub>**<sup>24</sup> in Switzerland under the current market conditions in the short term. While transport represents over half of this cost, the high prices also stem from the challenging risks faced by biogenic emitters, for example “take-or-pay” contracts<sup>25</sup> for storage space. Although the costs will decrease over time thanks to economies of scale as capture and transport solutions become more popular, the first-movers on CDR will face high production costs.

<sup>23</sup> [Business Models for Engineered Greenhouse Gas Removals by UK Department for Business, Energy and Industrial Strategy](#), October 2022

<sup>24</sup> Carbon Capture, Transport and Storage (CCTS) supply chain assessment for early movers, Oeuvray, Becattini and Mazzotti, 2022

<sup>25</sup> [Definition take-or-pay contract by Investopedia](#): Take or pay is a provision in a contract stating that a buyer has the obligation of either taking delivery of goods from a seller or paying a specified penalty amount to the seller for not taking them.

## This is what is needed:

In Switzerland, a compliance market allows for CDR projects, but the price that is being paid covers less than half of the estimated costs for removing CO<sub>2</sub>. A voluntary market for technical carbon removals is in place, although it is very limited in size. Monitoring, reporting and verification standards are, for the most part, still under development. In 2022, approximately 600,000 tCO<sub>2</sub> (equal to USD 226 million) were sold globally, with a fraction of them being sold in Switzerland.<sup>26</sup> Comparing these figures to the commitments needed by emitters (see Table 1 and Figure 2) for them to have sufficient investment security (so as to make a final investment decision), it can be concluded that **the voluntary market is currently too small to scale BiCRS effectively**. While this market can act as a catalyst, compliance mechanisms are urgently needed.

Without government intervention, we will see little BiCRS project activity in the coming years. **The government must get involved in the short term to enable the development of the BiCRS market.**

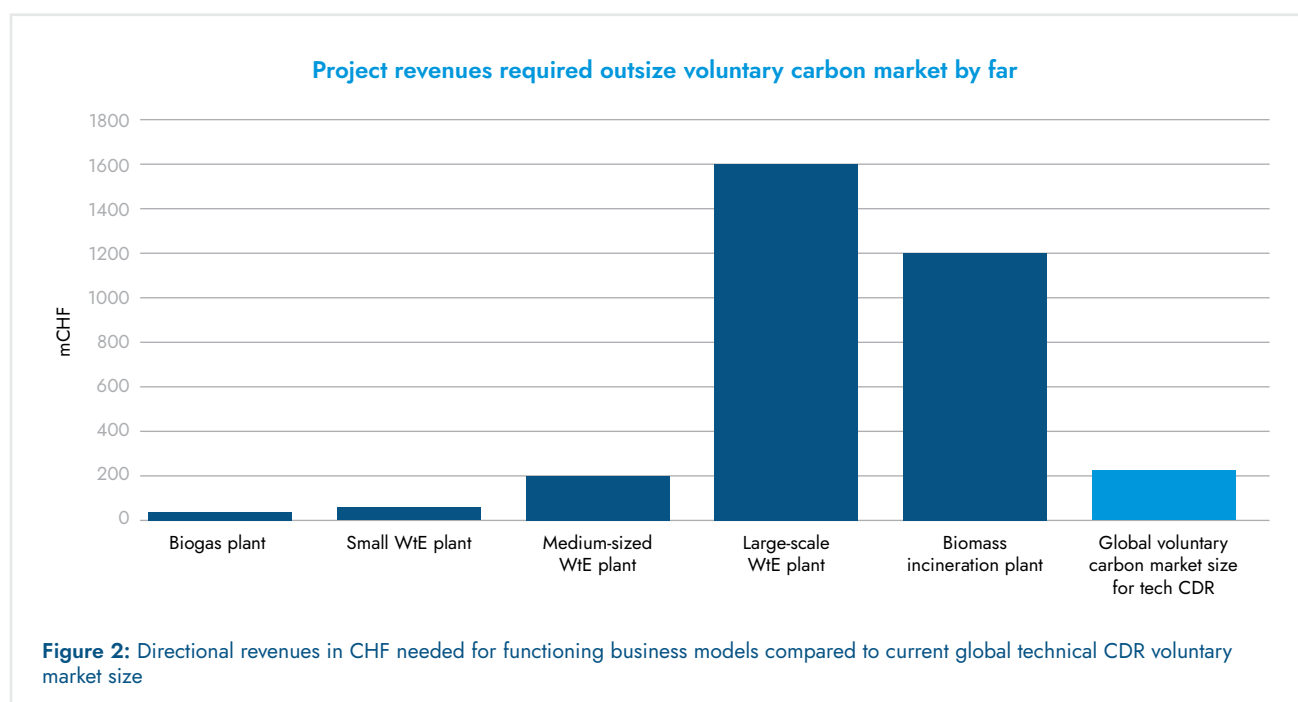
The upcoming Swiss climate law should also enable scaling through demand- and supply-side interventions to address high costs and minimise project risks.

**Table 1:** Directional sizes of Swiss biogenic emitter plants and required revenue streams for functioning business models

Plant Type	Annual removed tonnes in ,000*	Lifetime removed tonnes in ,000* & **	Annual revenues needed in mCHF*	Lifetime revenues needed in mCHF* & **
Biogas plant	10	100	4	40
Small-scale waste-to-energy plant	15	150	6	60
Medium-sized waste-to-energy plant	50	500	20	200
Large-scale waste-to-energy	400	4,000	160	1,600
Biomass combustion plant	300	3,000	120	1,200

\* The figures are indicative and calculated at a rate of CHF 400/tCO<sub>2</sub>. To make a final investment decision, an emitter usually needs to have commitments for purchases in place during the full lifetime of the capture infrastructure (i.e. last column).

\*\* Lifetime of the plant is considered 10 years, as this is the typical revenue security required to make a final investment decision. However, the plant's actual lifetime would extend beyond those 10 years.



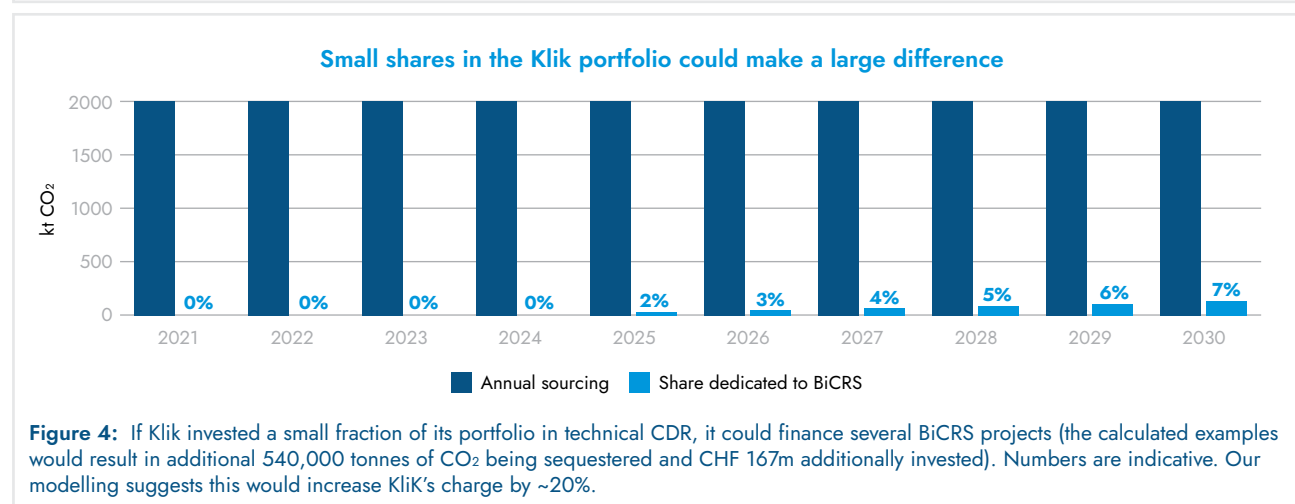
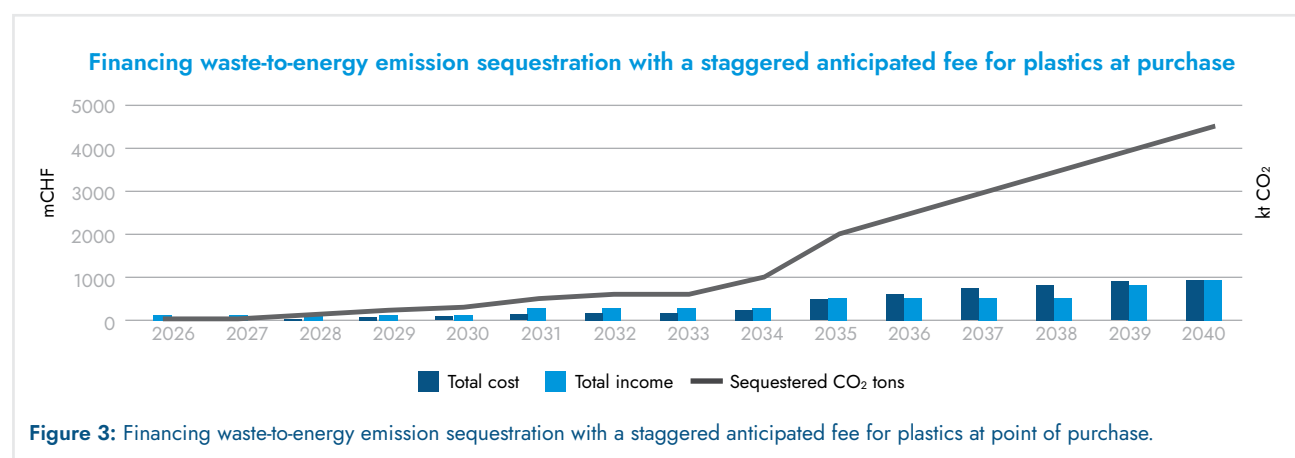
<sup>26</sup> CDR.fyi: <https://medium.com/cdr-fyi/cdr-fyi-2022-year-in-review-d095acd9a1a0>



## Suggestions for action to the Swiss government:

### → Government involvement in the short term to enable market creation

- **Introduce an anticipated fee** for plastics – similar to the anticipated recycling fee regulated in VERG/VRG<sup>27</sup> – at the point of purchase to create a national fund for carbon capture at waste-to-energy plants and to remove the first-mover disadvantage. A staggered approach, starting with a dedicated BiCRS-fee of CHF 130 per tonne of plastics at a use of ~1 million tonnes in Switzerland, would be hardly noticeable to the consumer but would cover the costs of several BiCRS projects (see Figure 3). If the anticipated fee was only used to cover the fossil fuel share of the emissions, the biogenic share of the emissions would have to be covered by an increase in the waste fees for the consumer. For this to be socially acceptable, accompanying socio-political measures may be required, such as corresponding adjustments to social benefits for low-income households.
- **Require public entities** to source technical CDRs to offset (part of) their residual emissions and require them to communicate these activities publicly in order to send signals to the private sector. Government procurement of technical CDRs is foreseen in the Climate Law and will be detailed in ordinance. This could also be applied to foundations with a relevant purpose, such as the KliK Foundation<sup>28</sup> (see Figure 4). The KliK 'adjustment' would potentially have to be legislated in the CO<sub>2</sub> Act, with consequences for the "Treibstoffabgabe".<sup>29</sup>
- **Provide demand guarantees** for first-mover CDR projects in the voluntary carbon market in case of payment default by the purchaser (e.g. for the first 1 million tCO<sub>2</sub> removed in Switzerland).
- **De-risk take-or-pay contracts** on storage sites by covering some of the risks that aren't borne by the supply chain actors (e.g. rail network deficiencies).
- **Initiate regulation for business models** for biomass and biogas plants that could be executed in the short term and pool money for CDR projects.



<sup>27</sup> Website Erecycling [Rechtliches/Politisches](#)

<sup>28</sup> [KliK Foundation](#)

<sup>29</sup> CO<sub>2</sub>-Gesetz und Klimaschutz

→ **Inclusion of demand- and supply-side interventions for CDR in the ordinances of the upcoming Swiss Climate Law (provided the Law passes referendum)**

- ♦ **Demand-side interventions**, which stimulate demand for negative emissions in the public and private sector:
  - **Introduce emission compensation schemes**, in which part of corporations' residual emissions are compensated using technical CDR certificates (roughly equivalent to a "takeback obligation" scheme).
  - **Enshrine in law an anticipated fee for plastics at the point of purchase**, ensuring that it covers the full cost of BiCRS at every waste-to-energy plant.
  - **Enshrine in law similar mechanisms for biogas and biomass plants**.
  - **Implement the public procurement of high-quality CDR**, which would be financed by new revenue streams (such as the ones above) or by leveraging new or existing fiscal resources (similar to the CDRLA [Carbon Dioxide Removal Leadership Act] regulation proposed in New York State<sup>30</sup>).
- ♦ **Supply-side interventions**, which would provide government support to project developers:
  - **Introduce revenue guarantees** to provide certainty to projects.
  - **Introduce tax credits** relating to the invested capital or profit per tonne of CO<sub>2</sub>.
  - **Develop a reverse auction support scheme**, similar to the one started in Sweden.<sup>31</sup>
  - **Introduce subsidies** to stimulate the sector, such as SDE++ in the Netherlands.<sup>32</sup>
  - **Establish a vehicle such as the European Innovation Fund** or the recently approved EUR 1 billion Danish CCS project fund to finance large-scale plants<sup>33</sup>.

<sup>30</sup> [The Carbon Dioxide Removal Leadership Act](#), 2022

<sup>31</sup> [Support scheme for bio-CCS](#), IEA, March 2022

<sup>32</sup> [SDE++](#), Netherlands Enterprise Agency

<sup>33</sup> [European Commission Press release](#), January 2023; [Innovation Fund](#), European Commission

## Issue 2:

**Connecting emitters with available long-term storage sites is the largest cost driver: current solutions are expensive for pioneering projects and the network plans do not enable the transportation capacity at the required scale post-2030.**

Of the CHF 490 it costs to remove a tonne of CO<sub>2</sub> via permanent underground storage, over half is linked to the cost of transporting the CO<sub>2</sub> to appropriate storage sites, which are currently only available in Nordic countries. These high costs are driven by the multimodal approach which applies during the Pioneering Phase. Transporting CO<sub>2</sub> from the site of emission, for example in Switzerland, to a permanent storage site involves using various means of transport, including truck, train, barge and ship options. This complicated and costly approach could be replaced by more suitable and affordable means of transport, such as pipelines, to enable increasingly large volumes of CO<sub>2</sub> in the future.

### This is what is needed:

The Swiss CO<sub>2</sub> transport network of tomorrow must be:

- **Inclusive** – to stimulate the development of offerings for all emitter sizes and geographies
- **Flexible** – to adapt to progressively increasing volumes and new, long-term geological storage sites, while avoiding stranded assets
- **Efficient** – to aim to minimise impact<sup>34</sup> (CO<sub>2</sub> emitted during transport and construction of transport assets) and the cost of transportation
- **Resilient** – to ensure the capacity to transport sustained volumes of CO<sub>2</sub>, taking combined transport approaches into account

### Short term (2024–2028)

In the short term, the volumes of CO<sub>2</sub> transported from Switzerland will likely be relatively small (<500k tCO<sub>2</sub> per year). However, it is crucial to build momentum in this period in order to provide confidence and enable the market's growth<sup>35</sup>.

It is crucial that transport options be combined in order to transport CO<sub>2</sub> volumes to existing geological storage sites. Most small- and medium-sized emitters do not have direct access to rail, which means that trucks are essential for “first-mile” transport. The route from Basel to the North Sea coast or to the Nordic countries can be managed by rail and/or barge – or a combination of both – in order to increase the resilience of the value chain.

Taking into account the complexity of the value chain, a key lever for bringing costs down further is aggregating volumes in Switzerland. The more volume that can be aggregated along the same routes, the more efficient the transport will get, and new transport modalities (e.g. bulk CO<sub>2</sub> barges & ships instead of ISOtainer) can be unlocked. This requires the creation of key nodes and intermediate storage as CO<sub>2</sub> gateways. Intermediate storage will also be crucial to improving the resilience of the value chain and ensuring that a constant flow of CO<sub>2</sub> reaches the geological storage sites, a contractual requirement considering the “take or pay” contracts<sup>36</sup>.

Finally, planning at a national and project level should consider the growing number of storage sites that will come online in the next seven years, as well as the medium-term transport solutions that may become available. This means transport infrastructure must be flexible to avoid stranded assets and planning at a system level would benefit such efforts.

### Medium term (2028–2032)

Sharp cost decreases are possible with **the implementation of an intra-Swiss pipeline network**, connected to international pipelines, some of which are currently already in planning<sup>37</sup>. According to the KVA Linth sus.lab study, transportation costs could fall under CHF 30 per tCO<sub>2</sub><sup>38</sup>, whereas currently best estimates are CHF 200 per tCO<sub>2</sub>. Engineering company SAIPEM estimates

<sup>34</sup> Particularly important for negative emission projects (biogenic CO<sub>2</sub>), where each tCO<sub>2</sub> emitted during transport & storage is an opportunity cost

<sup>35</sup> [The State of Carbon Dioxide Removal](#), 2023

<sup>36</sup> ‘Take or pay’ contract: this is a typical condition for geological storage sites, requiring payment for CO<sub>2</sub> storage whether the CO<sub>2</sub> is actually delivered or not, as they are limited in their capacity to shift volumes to other injection slots.

<sup>37</sup> [TES and OGE combine to develop 1000 km CO<sub>2</sub> transport network](#), April 2022

<sup>38</sup> [Feasibility of a demonstrator for the carbon capture and storage value chain](#) in CH with a waste-to-energy plant, slide 25, March 2021



that a Swiss pipeline would require approximately CHF 3 billion of investment.<sup>39</sup> Currently, this is conceptual and no operator is in the lead to take next steps. Although a Swiss pipeline is an enormous undertaking – considering the required involvement of entities on a national, cantonal and communal level – it would also be an industry-changing development with huge potential for climate mitigation, economic and industrial development, and research innovation. Besides, as national “green” infrastructure projects go, the investment is comparably moderate: for example, the wastewater treatment system was more than ten times more expensive.

It is crucial that such a pipeline be planned using a national lens, with strategic planning for potential “exit points” (i.e. towards the north through Basel, towards the south through Italy, etc.) and considering the needs of all emitter types. Post-2030, a significant number of geological storage sites should be online in Europe, giving Switzerland several options to choose from. However, Swiss emitters will face significant competition from other European emitters due to their smaller volumes.

Finally, the pipeline network should not ignore the small- and medium-size emitters who could aggregate at specific nodes of the network and expand the climate mitigation potential of Switzerland.

### **Suggestions for action to the Swiss government:**

#### **→ Ensure the legal requirements are in place to enable CO<sub>2</sub> transportation in Switzerland and abroad**

- **Sign bilateral agreements** with countries with the main geological storage potential (Norway, Denmark, Netherlands).
- **Clarify the legal requirements of transporting CO<sub>2</sub>** (i.e. waste or dangerous goods) and align with neighbouring European countries in order to facilitate cross-border transportation (ongoing).

#### **→ Stimulate the aggregation of volumes through national or regional planning and the promotion of clusters**

- **Develop a mapping** of point-source emitters and potential clusters, and enable the collaboration within such clusters.
- **Create a national registry** of point-source emitters interested in transporting CO<sub>2</sub>.

#### **→ Introduce research efforts around new CO<sub>2</sub> transport options inland (e.g. rail iso-tanks)**

- **Investigate the feasibility of CO<sub>2</sub> railtanks**, which today have short CO<sub>2</sub> holding periods unsuitable for long journeys to storage sites.
- **Explore further transport alternatives**, larger than ISOtainers and suitable for the requirements of CO<sub>2</sub> transport.

#### **→ Plan for common interest infrastructure such as intermediate storage in Basel**

- **Identify key common interest infrastructure** that will reduce the cost and/or facilitate the transportation of CO<sub>2</sub> from emitters in the short term.
- **Support project developers** with revenue guarantees or other de-risking mechanisms to compensate for the fact that this is a nascent and necessary market in Switzerland.

#### **→ Complete research and development to evaluate whether to commission an intra-Swiss CO<sub>2</sub> pipeline network**

- **Develop a business plan** for the pipeline, taking into account the government’s planned acceleration. This valuable exercise could be commissioned by the government and executed by a public or private research facility. This activity would generate strong interest among the possible operators.
- **Take the action required to create a legal basis** for the development of a pipeline as soon as possible, especially considering the scale of the undertaking.

#### **→ Complete research and development to evaluate the local geological storage capacity of Switzerland**

- **Promote research programmes** to better understand the Swiss geological storage potential and identify any opportunities for local CO<sub>2</sub> storage (ongoing<sup>40</sup>).
- **Enable a first pilot pre-2030** for local CO<sub>2</sub> storage to build Swiss capacity and expertise on the topic, and promote further opportunities in the sector.

#### **→ Address the public perception issue around transporting CO<sub>2</sub> to facilitate the development of a large-scale project**

<sup>39</sup> Presentation DemoUpCARMA of Akeret, Becattini and Mazzotti, November 2022

<sup>40</sup> [Motion 20.4063](#), 2020

**Airfix**, a new subsidiary of South Pole, combines decades of climate finance and carbon project development expertise with a vision for a scalable Biomass Carbon Removal and Storage (BiCRS) market in Europe. Unlocking the potential of BiCRS will empower crucial service providers to capture, transport and permanently store their carbon emissions.



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**Airfix is enabled by the Migros Pioneer Fund.**

