

Leaning on Uncertainty

Assessing governments' reliance on industrial carbon removals and land sinks to reach climate targets

NORWAY CASE STUDY
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At a glance...

For more information on carbon dioxide removals and a glossary, [click here](#).

Norway's approach to carbon removals is characterised by an uncertain strategy concerning the contribution of land-based removals to achieving climate targets, a lack of long-term implementation plans, and the absence of binding limits on integrating unproven international offsets.

The ambition of Norway's climate target hinges on how the country will account for emissions and removals in its land-use sector, a decision that has yet to be made. The latest revision of the Norwegian Climate Act, which sets national emission targets, does not include separate or specific land-use sector targets.

At the same time, the act is ambiguous about whether the land use, land-use change and forestry (LULUCF) sector is included in the overall sectoral scope of its climate targets for 2035 and 2050. The decision not to enshrine separate land-sector targets contrasts with a key recommendation from the 2050 Climate Change Committee, the government's appointed expert group for long-term climate planning, which prescribes disaggregating targets for emissions and removals from the land-use sector. Furthermore, the Norwegian Environment Agency flags overarching assessment gaps rooted in systemic issues within regulations, fuelling the continued degradation of land-based carbon sinks. Poorly formulated policy is the result of a lack of impact assessments, poor-quality assessments, and an absence of independent controls.

For engineered removals, assessments on constraints and risks are insufficient, although the expectations of removal volumes communicated to the UNFCCC are plausible. Latest projections of negative emissions from engineered removals in Norway's Biennial Transparency Report remain conservative at -0.2 MtCO₂eq per year (2030-2040) and are not based on estimations of the most optimistic theoretical potentials of 2.4 MtCO₂eq per year by 2035, as reported by the Norwegian Environment Agency.

A concerning provision in Norway's climate plans is the absence of binding limits on the use of international offsets. The Norwegian Climate Ministry stated in a response to a request for additional information that if current plans until 2035 materialise, "[...] the remaining need for international carbon credit and voluntary cooperation under Article 6 of the Paris Agreement will be equivalent to 3-8 per cent of 1990 [greenhouse gas] emissions [...]". It further notes that no such assessment was made for 2050. Evaluations of potential geological CO₂ storage sites reveal that undesired hindrance of future fossil fuel extraction is taken into account when evaluating storage options, potentially competing with aims to minimise leakage risks and the overall safety of storage sites.

¹Norwegian Environment Agency, Climate Action in Norway: Knowledge Base 2025, 2025, p156, <https://www.miljodirektoratet.no/publikasjoner/2025/januar-2025/klimatiltak-i-norge-kunnskapsgrunnlag-2025/>

Norway's current approach threatens to establish a climate strategy that is dependent on uncertain and highly vulnerable temporary removals in the land-sink and dubious international offsets, rather than focusing on necessary, well-assessed, and feasible domestic emissions reductions.

See Table 1 for an overview assessment of transparency and diligence considerations in Norway's plans to integrate carbon removals in its climate policy.





 TARGET SETTING	 REMOVALS POLICY	 TRANSPARENCY	 FEASIBILITY
residual emissions definition	industrial removals	land use & sequestration rates	land use & sequestration rates
residual emissions quantification	land sink	technology & energy	technology & energy
general transparency	financing	transport & storage	transport & storage
reliance on international offsets	depth of assessments	biomass	biomass

Table 1: Traffic light graph; cell colours represent the level of transparency, depth, and plausibility of made assessments and plans; green = overall relatively transparent and plausible, yellow = partly lacking transparency or depth, red = severe transparency gaps or identified delivery risks. The classification is meant to provide an overview of key issues and best practices and is relative to the other reviewed countries.

Methodology Note

The case study was developed by reviewing publicly available policy and assessment documents, supplemented by transparency requests to national ministries and agencies. Data on 17 themes, including residual emissions, technology assumptions, and biomass sources, were analysed to identify gaps and best practices in countries' industrial CDR and land sink strategies. From the identified themes, 12 indicators were selected, as visible in Table 1. The collected information was clustered into themes, and key issues were broken down and underscored by references to authoritative documents in the detailed analysis section.

The scope of the analysis was limited to documents created by or on behalf of government ministries and agencies, with supplementary documents included where necessary. Detailed information on the methodology is available in the accompanying report. All reviewed documents and supplementary sources are either directly linked in the text or can be found in the list of sources at the bottom of this document.

Detailed Analysis

Target setting

● Residual emissions and removal targets

While Norway's general definition of residual emissions is robust, the listed exemplary sectors and formulated targets reveal lenient principles.

Norway's [Long Term Low Emission Development Strategy](#) (LT-LEDS) offers strong wording in defining residual emissions as those “impossible to eliminate” (p7). When looking at which sectors this definition may apply to, Norway's approach becomes less stringent. The country's [Climate Report from 2025](#) lists exemplary sectors where some emissions are expected to be impossible to cut entirely, naming aviation, shipping, agriculture, petroleum and process emissions from industry (p145). Notably, the vague inclusion of the petroleum sector without clarifying whether it refers to its use or its production suggests a potential lack of commitment to phasing out fossil fuels.

The first estimates of the potential volume of residual emissions are available from the country's appointed expert group, the Climate Change Committee. In its outlook towards 2050, outlined in the [‘transition to low emissions’ report](#), the committee suggest that residual emissions would amount to 2.5 to 5 Mt in 2050, corresponding to a 90-95% reduction in emissions from 1990 levels (p23). The committee recommends that this target be reached domestically and without offsetting, while separately accounting for emissions and removals from the forestry and land-use sector. Nonetheless, the reviewed official government strategy and policy documents diverge far from these recommendations. Namely, climate plans permit the use of international offsets and propose to conflate emission reductions with land-sink removals, potentially leading to unscientific climate targets.

The ambiguous scope of Norway's climate targets and its undefined accounting in land-use sectors introduces uncertainty into planning for emission reductions and removals.

Section 5 of the Norwegian [Climate Change Act](#) formulates the long-term target of becoming a ‘low-emission society’ and reducing greenhouse gas emissions by 90-95% by 2050, compared to the reference year 1990. Intermediary targets are 55% for 2030 and 70-75% for 2035.

The scope of Norway's climate targets in the Climate Change Act is defined in Section 2, paragraph 2: "This Act applies to the emissions and removals of greenhouse gases covered by Norway's first nationally determined contribution submitted under the Paris Agreement of 12 December 2015." The scope of [its first NDC](#) was economy-wide and explicitly encompassed the land use, land-use change and forestry sector (p2-3) (see also BTR, p36). The same section also contains a provision allowing for the future inclusion of additional sectoral emissions and removals within the scope of the target, raising the question of which sectors, emissions, or removals are currently excluded.

Norway currently does not have a net-zero target. The Norwegian government justifies this by comparing a net-zero approach to the current 2050 emission reduction goal. The Norwegian Climate Ministry's [latest Climate Status and Plan report](#) states: "For Norway, a target of net-zero emissions would result in a lower level of ambition for emission reductions than the existing 2050 target. This is because Norway has a large amount of CO₂ uptake in standing forests, which would have been included in the assessment of target achievement." (p19) This suggests that at least part of the removals from the LULUCF sector are not accounted for in the 2050 target, constituting a significant shift from earlier interpretations. Whether industrial removals will contribute to the target is also not defined.

The intermediary 2035 climate target was newly added in 2025. The proposal text, which is separate from and more extensive than the text that entered into legislation, sheds more light on the scope of medium-term targets. The [proposed amendment of the Norwegian Climate Change Act](#), adopted in June 2025, clearly states that "additional LULUCF emissions and removals" are intended to be counted towards achieving the 2030 and 2035 targets, but does not specify the baseline for this additionality (p20). This adds another layer of uncertainty and may lead to temporary removals from the land-sink being used to offset emissions in other sectors. This could risk delaying needed and feasible emission cuts, depending on how 'additionality' is defined. A response from the Norwegian Climate Ministry to a request for additional information clarified that accounting methods for these additional emissions and removals are "not yet defined but will be defined soon". The reply was accompanied by a memorandum from January 2025 by the Norwegian Environment Agency, assessing three potential options for accounting, but noting: "More work remains to be done before we can make a concrete recommendation." (p40)

The obscure nature of Norway's climate targets and the still-undefined additionality of emissions and removals from land-use sectors make it challenging to identify the intended role of removals in national climate plans. This results in a lack of transparency and creates loopholes for backtracking on its climate targets.

Despite recommendations from the Climate Ministry and the Climate Change Committee, no separate LULUCF targets have been set beyond 2030.

For removals in Norway's LULUCF sector, the country currently adheres to the no-debit rule under Article 4(1) of the LULUCF Regulation, meaning that emissions in the sector may not exceed removals from 2021 to 2030. [Projections by the Norwegian Institute of Bioeconomy Research](#) (NIBIO) indicate that the goal will be reached despite rising gross emissions mainly resulting from land conversion for development (pp48-49).

Norway does not currently have a LULUCF emission or removal target after 2030. The Norwegian Environment Agency's Knowledge Base report recommends setting separate short and long-term targets for the LULUCF sector. Additionally, it notes that predicting the need for emission reductions in other sectors may be difficult if the LULUCF sector is included in overall climate targets (p52). It therefore argues against an overall climate target including LULUCF emissions and removals.

A similar recommendation comes from the Norwegian Climate Change Committee, an expert committee appointed to advise on Norway's path towards a low-emission society in 2050. One of its main recommendations, made in its 2023 report '[The transition to low emissions: Climate policy choices towards 2050](#)', is establishing separate targets for emissions and removals from land-based sequestration (p12). The Norwegian Climate Ministry's report from 2025, '[Climate Message 2035: On the way to a low-carbon society](#)', partly picks up these recommendations. It notes that "[...] climate targets with a ten to fifteen-year time horizon have not provided sufficient incentive for climate measures in the forest [...]", thus the Norwegian government "[...] will work to establish a long-term climate target for managed forests" (p148). The Ministry then missed the chance to implement the specialists' suggestions in its [2025 amendment proposal to the Norwegian Climate Act](#) (p27), acting against its own former stance and recommendations from Norway's expert committee and the Environment Agency.

Norway currently has no targets for permanent removals, while the latest projections, which only run until 2040, remain cautious.

Projections in [Norway's first Biennial Transparency Report](#) (BTR), first submitted in December 2024, include a comparably low level of industrial removals. It estimates -0.2 Mt CO₂eq from bio-CCS and DACCS, available from 2030, remaining at that level until 2040 (p98). In its analysis of theoretical emission reduction potentials in the ETS pillar, the Environment Agency's [2025 Knowledge Base report](#) includes a combined potential of 2.4 Mt CO₂eq removals from bio-CCS and DACCS by 2035 (p18). The fact that Norway's BTR assumes levels well below this theoretical potential reflects a grounded approach that accounts for unresolved uncertainties. While the projected volumes still

face unanswered questions about their quality, financing, and use, they demonstrate a needed degree of caution in Norway's permanent removal plans.

● General transparency

Norway's removal plans show several transparency gaps in goal-setting.

The Norwegian Climate Act and its underlying documents do not clearly distinguish between net and gross emissions, denoting low levels of transparency and raising concerns about accountability. Key examples include the ambiguity on the accounting of the LULUCF sector in [Norway's Climate Act](#), and the unclear distinction between net and gross emissions in foundational assessment documents, such as the Environment Agency's [Knowledge Base report](#). Additionally, the lack of explicitly communicated ambitions for industrial removals and descriptions of how tradeoffs will be taken into account represents a transparency gap that adds uncertainty to long-term climate planning.

Projections for the LULUCF sector are an example of best practice in transparency.

A document exhibiting a high degree of transparency is the NIBIO report '[Projections for the land use sector](#)'. In the analysis, the underlying assumptions and potential effects of changing them are clearly outlined, while uncertainties are thoroughly described. Projections extend to 2100, but it is clarified that these are subject to greater uncertainty due to the longer timeline. This level of transparency would enable greater predictability, credibility, and quality in climate mitigation if it were maintained throughout the decision-making process - from sectoral assessments to economy-wide projections and ultimately to policy.

Notwithstanding, Norwegian climate policy documents tend to become less transparent over this progression. An example is the disaggregation of sectors, reasoning, and assumptions in the '[Projections for the land use sector](#)' report, which are strongly simplified or absent in Norway's [Biennial Transparency Report](#). Ultimate policy, such as the updated [Norwegian Climate Change Act](#), then fails to provide a minimum level of transparency by not establishing separate targets for the land-use sector.

Norway's proposal for the 2025 Climate Act amendment demonstrates strong procedural transparency in its consultation process for the 2035 climate target.

The [proposed amendment to the Norwegian Climate Law](#) transparently discloses the consultation document and the list of participating bodies, organisations, and private individuals (pp10-15). Stakeholder feedback, reflecting the positioning of different groups and openly acknowledging expressed critiques of Norway's past and current climate policies and measures, is comprehensively described (pp20-25). The Ministry of Climate and Environment openly outlines how this feedback was considered and provides clear reasoning for its decision-making (pp25-29).

● Reliance on international offsets

Norway explicitly plans to use international credits to meet its 2035 climate target, with reliance quantified at 3-8% of 1990 emissions according to the Norwegian Ministry of Climate and Environment.

Norway's [proposed amendment of its Climate Act](#) (2025) includes plans to use Article 6 credits for the 2030 target if EU cooperation is insufficient. It also states that Article 6 flexibility will be 'necessary' for achieving the ambitious 2035 target. According to Norway's 2025 [Biennial Transparency Report](#), funding for international credits would come from the state budget (p50). In response to a request for additional information, the Norwegian Ministry of Climate and Environment outlined plans to reach a domestic emissions reduction of 67%, with the remaining 3-8% reduction towards the 70-75% target achieved using Article 6 credits (p5).

The quality of international carbon credits is raised as a concern, but no limitations on their use are put in place.

The [proposal to amend the Norwegian Climate Act](#) (2025) notes high uncertainties about the availability of high-quality credits with sufficient environmental integrity (p32). It also states that the 2035 target will be achieved mainly through national measures and cooperation with the EU (p26). If developments continue as expected, based on conducted projections, more than 90% of the emission reductions needed to meet the 2035 target would occur nationally or through cooperation with the EU (Ibid.). Yet, without binding limits on credit use, this already lenient and non-binding domestic focus remains vulnerable to being diluted by international offsets that may incur high costs while delivering [uncertain real climate mitigation](#).

Removals policy

● Specific plans and foreseen measures

Norway's climate plans lean on bio-CCS, DACCS, and biochar, with expectations of volumes lowering over time.

The identification of novel technologies and measures relied on are inconsistent across documents and are not explained transparently, while volume estimates vary greatly.

The Norwegian Environment Agency reported estimates for DACCS and bio-CCS in its 2023 document '[A 2035 contribution that ensures national transformation](#)'. When assessing possibilities towards the 2035 climate goal under the Paris Agreement, the report proposes a scenario with 1,7 Mt CO₂ removed through bio-CCS and 1 Mt CO₂ removed through DACCS in 2035 (p44). These removal volumes are inaccurately labelled as 'reductions' in industry sectors. This possibly suggests a predetermined allocation to the sector, which disregards an outstanding discussion on residual emissions and an imprudent use of anticipated removals.

The Climate Change Committee estimates in [its 2023 report](#) that, in 2050, bio-CCS will be able to remove 1.5 Mt CO₂eq (p56). This estimation for 2050 would be lower than the Environment Agency's [projection](#) for 2035, raising questions about the feasibility of expected volumes in 2035.

The Norwegian Environment Agency's [2025 Knowledge Base report](#) then specifically mentions DACCS, bio-CCS, and biochar as considered measures (p14-15, p18). In the same document, future estimates show that biochar is expected to nearly double from 46 kt CO₂eq in 2030 to 82 kt CO₂ in 2035, and DACCS to scale significantly from 56 kt CO₂eq in 2030 to 806 kt CO₂eq in 2035. For bio-CCS and DACCS, a combined estimation of 2.4 Mt CO₂eq by 2035 is estimated (p18).

The Norwegian Ministry of Climate and Environment refers to the 2025 Knowledge Base report in its [Climate message 2035 report](#) (2025), and mentions an overall potential for technological CDR of around 2.4² Mt CO₂eq in 2035, based on ongoing projects (p146). However, it notes that "[...] unlocking that potential [...] requires strengthened instruments" (p146).

The latest projections by Norway's Climate Ministry are more cautious. For biochar, only a negligible contribution of 49 t CO₂eq in 2030 is projected in its [Biennial Transparency Report](#) (p229). For BECCS, the document includes assumptions that negative emissions

² The 2.4 Mt bioCCS and DACCS potential assumes all industrial biomass use would be combined with CCS. (see 2025 Knowledge Base Report & [104: Increased use of biomass in industry](#))

will come from two sites: a cement plant and a waste-to-energy plant (Brevik and Klemetsrud), which are expected to deliver -0.2 Mt CO₂ negative emissions per year from 2030 to 2040 (p109). DACCS is not explicitly mentioned in the document; it is unclear whether the technology is still relied on in Norway's long-term climate plans. The internally inconsistent and partly conflated projections of relied on removal technologies and measures for 2050 result in a missing vision of possibilities and low credibility of Norway's long-term climate commitments.

Planned future measures to stabilise the land sink lack quantification and modelling.

Several measures for the LULUCF sink are mentioned in Norway's 2025 [Biennial Transparency Report](#). These include higher seedling densities in existing forest land, plant breeding, and nitrogen fertilisation of forests, among others (p81). No quantification of these measures or their effects could be found. In a list of policies and measures that are no longer in place, an afforestation 'pilot project' is listed, but it was never implemented (p88). No further information on this measure is given in the document. The project was abandoned due to high upfront costs for landowners and long time frames for financial returns, as explained in the [measure sheet for afforestation](#) by Norway's Environmental Agency. The Climate Ministry, in its 2021 Climate Action Plan for 2021-2030, estimated net removals from afforestation to be 6 Mt CO₂eq from 2021 to 2025. (p151). Whether this expected sequestration is connected to the cancelled measure is unclear.

Projections in Norway's [Biennial Transparency Report](#) outline two scenarios. A baseline projection (WEM) and a projection of planned future policy and measures (WAM). The fact that they show identical values for the LULUCF sector strongly indicates that no additional measures were foreseen for the sector when the document was written.

Modelling approaches for Norway's ETS and LULUCF sectors are clearly disclosed, though key decisions on LULUCF accounting are still pending.

For the ETS pillar, the Environment Agency's [Knowledge Base report](#) employs a bottom-up approach for emission forecasts, based on industry input and submissions from petroleum companies (p17). For LULUCF projections, Norway's 2025 [Biennial Transparency Report](#) clearly outlines the used models and simulated factors (growth, mortality, ingrowth). However, there is uncertainty about how accounting in the LULUCF sector will work. According to the [proposal for the 2025 amendment to the national Climate Act](#), Norway intends to clarify methodologies for additional LULUCF emissions and removals in the near future. The new calculation method is intended to be applied

to both the 2030 and 2035 targets (p9). It is noted that full forestry sector accounting in 2035 would require changes to the target figure to align with the Paris Agreement's progression requirements (p19). Responding to a request for additional information, the Ministry of Climate clarified that a decision on the specific calculation method is forthcoming and that initial assessments have already been conducted.

● Associated financial cost and source of financing

First cost estimates for CDR deployment have been made, though no consideration of potential funding sources has been found in official documents.

In the Norwegian Environment Agency's 2025 [Knowledge Base report](#), costs for DACCS are projected at 3,000 to 5,000 NOK (approximately 260-430 EUR) per ton around 2030/2035. Biochar costs in the same timeframe are estimated below 500 NOK per ton (about 40 EUR). Both of these cost projections are within the range of estimates of future costs in scientific literature³. However, the numbers for biochar are mostly based on estimations for 2050, not 2035. Cost estimates for bio-CCS are notably lacking in evaluations, despite the technology being central to Norway's long-term climate strategies.

Norway is exploring several mechanisms to finance industrial carbon dioxide removals.

The Norwegian Environment Agency's [2035 contribution report](#) outlines ideas such as an auction-based deployment tool or a 'reverse tax' model, where the state would purchase industrial carbon removals to achieve national climate goals (p35). To address barriers and market failures in the CO₂ management value chain, the Norwegian government commissioned a study on 'instruments for industrial carbon removal', as outlined in the 2025 [Government's Climate Status and Plan report](#) (p107). The resulting study by Oslo Economics, titled '[Measures for industrial carbon removal](#)', provides a comprehensive techno-economic assessment of engineered CDR technologies. It outlines overall financing needs based on Environment Agency projections and describes various financing tools and their implications. The inclusion of the distribution of costs and risks between the state and private stakeholders can be seen as a notable best practice that other states can draw from (p37).

³ Bednar J., Höglund R., Möllersten K., Obersteiner M., Tamme E., *The role of carbon dioxide removal in contributing to the long-term goal of the Paris Agreement*, 2023, <https://ivl.diva-portal.org/smash/get/diva2:1825937/FULLTEXT01.pdf>

Undefined financial support for 'forest management' leaves unclear whether subsidies are tied to achieved climate benefits.

For the LULUCF sector, additional subsidies are already in place. The Norwegian government mentions in its [Climate Status and Plan report](#) that it has increased financial support for forest management by 5 million NOK (approximately 430,000 EUR). While this flow of money is foreseen, given the lack of specific long-term targets for the land sink, it is not clear if the purpose of these subsidies is to increase the land sink or if they serve the achievement of other goals.

Constraints and risks

Norway's Environment Agency has identified systemic deficiencies that affect the production of impact assessments, and that may undermine informed CDR policy development.

In its 2025 [Knowledge Base report](#), the Norwegian Environment Agency notes that it had submitted a proposal to revise multiple regulations on impact assessments to the Ministry of Climate and Environment and the Ministry of Local Government and Regional Development. The Agency raises major misgivings about present rules, pointing out that "current regulations and practices lead to a lack of impact assessments, a lack of knowledge base for overall plans, poor quality of assessments and a lack of control of impact assessments" (p166). This suggests that existing environmental and climate-related assessments may be inadequately informing policy decisions. Given the urgent need for high-quality assessments to inform removal policies, this poses a key concern for both overall climate planning and CDR policy in Norway.

Norway's Climate Ministry recognises multiple sustainability concerns associated with industrial removals, but assessments have not yet been conducted.

The Norwegian Climate Ministry's 2025 [Climate Message Report](#) acknowledges several challenges for CDR, including land use, energy use, and technology development. It notes that "the actual potential for bio-CCS is therefore much smaller than the theoretical potential when limitations due to environmental, social and economic effects are taken into account" and that "in the work to scale up carbon removal activities, these challenges must be addressed" (p146). However, when more information was requested, the Climate and Environment Ministry revealed that no in-depth assessment has been conducted yet for bioCCS or DACCS (p6). It is notable that an in-depth assessment of financing tools for CDR has been conducted, as described

above; nonetheless, an evaluation of a similar scope on the potential social and environmental effects of industrial removal deployment is missing. This gap between acknowledged challenges and actual assessment shines light on the need for more comprehensive evaluations of CDR technologies.

● Land use and sequestration rates

While land use pressures resulting from permanent and land-based removals are recognised, evaluations of potential trade-offs are lacking.

Norway acknowledges the significant land use for projected afforestation and BECCS in its [LT-LEDS](#) (p9). Potential climate measures were assessed by the Norwegian Environment Agency, with information condensed in measure sheets. Acknowledged and partly assessed barriers for removal measures can be found in the measure sheets on [afforestation](#), [biochar](#), and the [increased use of biomass in industry, including BECCS](#). The measure sheet on afforestation refers to existing sustainability criteria for implementation, including considerations of biodiversity and agriculture. However, the impacts of Norway's afforestation plans on land use remain unquantified. For BECCS and biochar, no sustainability criteria or evaluations of expected land use for biomass production were found.

Norway acknowledges existing risks for the land sink and their amplification through climate change across multiple documents, but does not include them in the conducted modelling.

The Norwegian government's [Climate Action Plan for 2021-2030](#) (pp168-169) identifies uncertainties, including wildfires, increased volatility from climate change, and potential conflicts with biodiversity rules, such as those set out in [Norway's Nature Diversity Act](#). Potential conflicts with biodiversity legislation may arise from focusing on short-term sequestration, omitting concerns of species diversity and preservation of old-growth forests.

While climate-related impacts on LULUCF sinks are recognised in the Environment Agency's [Knowledge Base report](#), projections rely on historical trends and do not account for expected increases in climate-related damages. This results in considerable uncertainties (p157). Norway's [Eighth National Communication to the UNFCCC](#) states that projections "do not directly model the increased risk of damages from climate change, as the input data on damages are from the historical reference period" (pp163-164). [NIBIO projections](#) from 2024 similarly do not account for higher

climate-related damages (p73). Additional acknowledged uncertainties under a changing climate include forest growth rates, development, and standing volume, but they are not incorporated into modelling (p73).

● Technology and energy

The technological development assumptions underpinning Norway's climate plans are poorly documented, yet sensitivity analysis suggests they could have significant effects.

The only mention of technological development assumptions found is a sensitivity analysis in Norway's [Biennial Transparency Report](#). It outlines an assessment of the effect of changes in technological development assumptions on projected emissions. Findings show that a 1% change of annual technological development from 2024 to 2040, depending on the direction, could result in an increase of 1.3 Mt CO₂eq or a decrease of 1.2 Mt CO₂eq in annual emissions in 2040 (p118). This underscores the need for transparent communication of technological development assumptions, given their significant impact on model outcomes.

For industrial carbon removals, a general conjecture for technological development is mentioned in a 2024 study by Oslo Economics titled '[Measures for Industrial Carbon Removal](#)', prepared on behalf of the Norwegian Environment Agency. It assumes that costs for industrial removals will decrease rapidly through scaling, learning, and mass production. Beyond this, no forward-looking assessments or considerations on technological development specific to removals were identified in the reviewed documents.

Estimates of future energy demand for industrial removals in Norway exist, but potential consequences have not yet been assessed.

The Norwegian Environment Agency, in its 2023 report '[A 2035 Contribution that ensures National Transformation](#)', includes first approximations of energy demand. It provides an estimate of power consumption through DACCS of 1 TWh per MtCO₂eq, while offering only a conflated assessment of 1.7 MtCO₂eq bio-CCS and 2.6 Mt CCS consuming 3 TWh (p44). It is not clear whether the modelling assumes these volumes will be captured in 2035 or by 2035. Given the preceding plans, which mention yearly DACCS volumes of 0.2 Mt from 2030, totalling 1 Mt over the 5-year period, a cumulative estimate might be assumed. While these energy demand estimates for removal technologies are mentioned, the consequences have not been assessed (p43). The Norwegian Environment Agency's assessment rests on energy price assumptions,

increases of which could be a potential barrier to implementing the noted climate measures (Ibid.).

The more recent Environment Agency's [Knowledge Base report](#) from 2025 provides a significantly lower estimate of power demand of 0.682 TWh for DACCS volumes of 1.336 Mt CO₂ from 2030 to 2035, but likewise does not elaborate further (p14). The discrepancy between the earlier 1TWh per Mt CO₂ estimate and the more recent 0.510TWh per Mt CO₂ estimate raises questions on the scope and assumptions underlying the assessments. The fact that neither the DACCS energy demand evaluation provides a source for their estimates nor clarifies the scope of those estimates represents a crucial transparency gap.

● Transport and geological storage of CO₂

Even though Norway has large presumed/theoretical volumes of domestic geological CO₂ storage capacity, government assessments lack consideration of practical feasibility.

In-depth assessments of storage capacity in the Norwegian Sea have been conducted on behalf of the Norwegian Offshore Directorate (formerly the Norwegian Petroleum Directorate), as outlined in the '[CO₂ Storage Atlas](#)' report. It was estimated that the geological storage capacity amounts to ca. 67 Gt CO₂. The assessment document does not provide an economic and environmental analysis of storage sites, leading to uncertainties about their safety (e.g., geological disturbances, effects on local populations, and environmental impacts) and the portion of the theoretical capacity that might actually be economically usable.

The report also mentions risks to seal integrity and leakage concerns that are currently part of ongoing research (p66). The lack of further evaluation of risks is concerning as the Norwegian government is already making deals with multiple other countries (e.g., [Belgium](#), [France](#), [Switzerland](#)) to store their CO₂ in domestic geological reservoirs in the North Sea. The reliance of other countries on Norway to store their captured CO₂ exacerbates delivery and quality risks resulting from incomplete storage assessments.

Norway assesses storage sites based on whether they might interfere with future petroleum activity, directly contradicting climate goals.

The [CO₂ Storage Atlas](#) includes a concerning detail in the evaluation approach of storage sites. At the bottom of a table describing the evaluation factors for geological storage structures, additional factors are listed. These include the "[p]otential for conflicts with

future petroleum activity” (p16). The fact that storage sites are evaluated by their potential to impede additional oil exploration and extraction directly contradicts what removals must be used for: to complement efforts to slow down and ultimately reverse climate change effectively.

● Biomass supply

Norway's climate planning documents reveal a significant lack of evaluation of biomass demand and its sources.

The Environment Agency's 2025 [Knowledge Base report](#) lists assessed climate measures and their estimated effects. The table in the document provides no assessment of biomass demand for biochar or 'increased use of biomass in industrial processes' (pp14-15), despite biomass supply constraints being a key concern for these measures.

The document's appendix refers to measure sheets, where further in-depth assessments are supposed to be outlined, and mentions expected changes in biomass needs for 2035 (p224). On the Norwegian Environment Agency webpage, there are measure sheets for the identified measures listed in the 2025 Knowledge Base report. The [sheet for biochar](#) acknowledges existing competition for raw materials with other uses, such as compost, bedding, and feed, as well as increased biomass use in industry. For [increased biomass use in industry](#), a suggested precursor for BECCS deployment in Norway's plans, the measure sheet notes that no sustainability criteria exist for solid biomass in industry, and assumes biomass will come from wood processing or pulpwood waste streams.

The [measure sheet](#) states that biomass availability may become a significant barrier, given that supplied volumes must be sustainable raw material. Notwithstanding, the document makes clear that the Environment Agency has not yet assessed potential solutions: “We have not assessed any instruments for removing the barrier related to access to sustainable raw materials.” The lack of evaluations and consideration of the required volumes and the feasibility of sourcing biomass for the suggested volumes of bio-CCS and biochar creates a foundational gap, making it much more difficult to forge reasonable projections and considerations in other sectors.

While cross-sectoral competition for biomass and uncertainties on its supply, which BECCS and biochar might exacerbate, are acknowledged in the [NIBIO LULUCF projections](#) (p72), they remain unmodeled. The assessment, which models the development of the land-use sector for the short and long term, makes clear that the

projections “[...] are based solely on trends in historical data and do not take into account projected developments in other sectors” (p72).

The Norwegian Climate Ministry expects to import necessary volumes for biochar, raising sustainability concerns.

A direct response from the Ministry of Climate & Environment to a request for additional information revealed that most biochar is expected to be imported. This risks shifting adverse effects from higher biomass demand to other countries, potentially with even less robust systems for protecting ecosystems. The response estimates that domestic production, using best available techniques from forestry waste and residues, would require approximately 3.5 million m³ of wood (p5) - a volume amounting to more than a quarter of [Norway's annual roundwood production](#).

Assessments suggest that the sustainability of biomass might strongly limit potential volumes of bio-CCS.

Projections by Norway's Environment Agency for 2035 in its [Knowledge Base report](#) exhibit a higher potential for bio-CCS (1.64 Mt CO₂eq) than [estimates from the Climate Change Committee](#) for 2050 (1.5 Mt CO₂eq). One major difference between the two assessments is that the Environment Agency's estimation does not take sustainability criteria for biomass into account, while the Climate Change Committee does. This raises feasibility concerns about the projected volumes of bio-CCS in the Agency's outlook towards 2035. The Climate Ministry mentions the potential of industrial removals, including bio-CCS, in its 2025 [Climate Message Report](#), while acknowledging biomass trade-offs and the need for safeguards to prevent biomass extraction exceeding sustainable levels (pp146-147). These divergent projections underscore the critical importance of incorporating rigorous sustainability criteria into bio-CCS planning. Neglecting biomass constraints could lead to overestimating feasible carbon removal volumes and undermining long-term climate mitigation strategies.

Key issues

The Norwegian government's carbon removal plans suffer from vaguely defined targets and a lack of impact assessments, while offering no clear vision beyond 2040. No target date for net-zero emissions is enshrined in plans, raising uncertainty over the extent of reliance on CDR in the long term. Rather than a clear outline for responsible domestic action, the strategy emphasises the use of international offsets.

1. A conflated 2035 target and absent LULUCF targets introduce a high degree of uncertainty for the climate planning of other sectors.

Norway lacks separate targets for the LULUCF sector beyond 2030, despite recommendations from both the Environment Agency and the Climate Change Committee to establish distinct commitments for emissions and removals from the land sector. Instead, the new 2035 Climate Act target integrates LULUCF without defined accounting methods, conflating emissions and removals. This approach conceals emissions in other sectors, weakens the required decarbonisation pressure from legislation, and creates uncertainty for industries working to decarbonise.

2. Norway faces systemic assessment deficiencies while its planning priorities conflict with climate goals.

Norway faces systemic deficiencies in impact assessments for CDR policy, as the Norwegian Environment Agency itself acknowledges. No comprehensive evaluations exist for sustainable biomass supply constraints, despite a significant estimated demand of about 3.5 million cubic meters of wood only for biochar⁴. Skewed priorities become apparent in Norway's assessment of potential geological CO₂ storage sites. Here, one of the evaluation factors is 'potential conflicts with future petroleum activity' - directly contradicting climate goals by prioritising continued fossil fuel extraction over potentially limited high-quality carbon storage.

3. The overall lack of high-quality long-term projections for Norway's emissions and removals risks delaying crucial assessments, decisions, policies and implementation.

⁴ A direct response from the Ministry of Climate & Environment to a request for additional information states: "Most of the biochar will probably be imported and can be produced from a variety of feedstocks, through different processes. We have a rough estimate that if produced with best available techniques from waste and residues from forestry the feedstock needed might be about 3.5 million m³ wood (with heat and bio-oil as byproducts)." (p5)

While Norway's latest permanent removals projections until 2040 in its Biennial Transparency Report (p98) are cautious, leaning on the lower end of estimations, the lack of expressed limits and high variability of expected volumes past 2040 in reviewed documents raise concerns. Decisions over the level of reliance on technological removals still have to be made and without clear targets and timeframes, Norway may lock in unsustainable pathways or miss critical moments for climate mitigation action.

4. Norway's high reliance on Article 6 credits risks undermining domestic emission reduction.

Documents obtained indicate that Norway expressly intends to use international carbon credits to offset 3-8% of its 1990 emissions for its 2035 reduction target, with no binding limits on credit use. Despite claims that 90% of reductions would occur nationally, this approach could displace domestic mitigation efforts. Without binding limits on international offsets of questionable quality, Norway risks diminishing incentives to reduce domestic emissions, potentially deterring needed short-term emission cuts.

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