BeZero Carbon Final ex ante Risk assessment report

5001: Promotion of climate smart agricultural practices for sustainable rice cultivation in Ghana

Commissioned by the Federal Office for the Environment (FOEN)

London, June 2025

BeZero

Project details

Particulars	Details
Customer name	Swiss Government
Project name	Promotion of climate smart agricultural practices for sustainable rice cultivation in Ghana
BeZero Carbon sector group	Nature-Based Solutions
BeZero Carbon sector	Soil Carbon
BeZero Carbon sub-sector	Soil-Related Agricultural Practices
Methodology	Adapted from CDM methodology AMS-III.AU, version 4
Project proponent	United Nations Development Programme (UNDP)
Location	Ghana
Project implementation period	Predicted implementation: 2022-2030
Project commitment period	Eight years
Project crediting period	01/10/2022 to 31/12/2030
Total ex ante forecast	1, 125, 655 tCO_2e
Key reference documents	BeZero Carbon ex ante Rating methodology
Report date	18 June 2025

Imprint
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Contents

Executive summary

Our risk factor assessment corresponds to the criteria set out under the bilateral agreement between Switzerland and Ghana, the Paris Agreement, and the Swiss CO_2 Ordinance. The key recommendations provided in this report details how the project can further meet these requirements.

Project description

‘5001: Promotion of climate smart agriculture practices for sustainable rice cultivation in Ghana’ is a soil-related agricultural practices project that is being established by the United Nations Development Programme (UNDP) and the Government of Ghana. 5001 aims to expand the use of system of rice intensification (SRI) in Ghana. SRI is a practice of growing rice which aims to increase rice yields and reduce resource requirements. Principles of SRI include raising high-quality seedlings in a nursery, transplanting young seedlings, weeding, and water management [1]. This project issues credits for avoided methane emissions as a result of changes in water management. As part of SRI, the project will implement alternate wetting and drying (AWD), which reduces methane emissions relative to the baseline scenario of continuous flooding. The project is implemented by farmers on their land at the direction of the Government of Ghana.

The project activities include providing technical advice and resources to support farmers in implementing SRI in order to increase yields and reduce resource consumption.

Through the implementation of AWD by the project, 5001 has a projected issuance of 1,125,655 tCO_2e over the project's lifetime. To calculate and quantify its credit issuance, the project plans to use the Clean Development Mechanism methodology AMS-III.AU as a starting point. The project is part of the Article 6 agreement between Ghana and Switzerland.

Part 1: Carbon risk assessment

Additionality

We assess there to be low risk to additionality for credits issued by 5001.

BeZero Carbon is of the opinion that once the project reaches operational stability, credits issued by 5001 likely face low additionality risk. This is primarily due to the project's accurate representation of the alternative land use scenarios, a requirement for carbon finance in order to conduct activities, the existence of barriers to project activities, and limited policy support for such activities. However, some risk remains related to uncertainty regarding the scale of project activities.

Carbon accounting

We find that the project faces very high carbon accounting risk.

BeZero Carbon is of the opinion that credits issued by 5001 face very high risk in relation to carbon accounting. This view is based on the project's use of emission factors derived from default values for the first half of the crediting period. Risk is also introduced by the exclusion of nitrous oxide and carbon dioxide emissions from the project's carbon accounting, as well as the limited disclosure of in-situ monitoring arrangements to verify project activities, which may result in the project's climate benefit being overstated, in our view. However, this risk is mitigated by the use of a conservative global warming potential, and very low risk of both activity shifting and market leakage.

Permanence

Our assessment finds the project has the highest likelihood of permanence.

BeZero Carbon is of the opinion that credits issued by 5001 face the highest likelihood of permanence as there is no technical risk of reversal.

Information risk

Information risk is the risk posed to our assessment of a project's carbon efficacy due to the reliability or robustness of the available information. The more information available for our analysis of a project's carbon efficacy, the lower the information risk for the project. BeZero Carbon is of the opinion that credits issued by 5001 face very high information risk. This is driven by a lack of project boundaries indicating where the project is currently operating, the non-disclosure of the data used to justify that project activities are not common practice, and limited information on future monitoring.

Part 2: Project execution risk

The BeZero Carbon ex ante Rating applies project execution risk to the standalone carbon rating. It evaluates the risk that a project will fail to be implemented and become operational as planned. Our assessment of project execution risk applies to the entirety of the planned project.

We are of the view that the project faces high project execution risk. This assessment is driven by high operational risk as farmers may withdraw from the project, compounded by the project enrolling fewer farms than expected. There is also operational risk as the project is operating over a smaller area than planned, and there is a concern that farmers may withdraw from the project. We also consider there to be high financial risk, driven by limited information on the financial viability of the project. Some technical risk is raised by the methodology employed by the project, although the technology itself is well established. However, risk is somewhat mitigated by the extensive past

experience of the project proponent, and little legal and regulatory risk due to the strong position of Ghana in the carbon markets.

Key recommendations

We consider there to be a number of key factors that can be implemented by the project to reduce risk. These are primarily related to the disclosure of information and the carbon monitoring employed by the project. These recommendations can also help to ensure that the project meets the requirements set out in the bilateral agreement between Switzerland and Ghana, the Paris agreement, and the Swiss CO_2-ordinance.

Methodologies that aim to generate climate benefits from changing water management practices in rice fields have recently undergone several changes. Following the permanent inactivation of the AMS-III.AU.: Methane emission reduction by adjusted water management practice in rice cultivation methodology [2], Verra is developing M0253: Improved Management in Paddy Rice Production Systems [3]. This methodology is currently under consultation, but we believe that there are a number of factors that may reduce risk. These include:

- Requirements to justify that the project activities are not common practice against a 20% benchmark. The methodology states that this could be demonstrated through agricultural census, peer-reviewed scientific literature, independent research data, or an attestation statement from a qualified, independent local expert. Additionality risk may persist depending upon the implementation of these methods.
    - In our opinion, additionality risk is likely to be reduced if a look-back period is adopted to confirm what water management regime (or relevant activity) was occurring within the project area before the project began (see VM0042: Methodology for Improved Agricultural Land Management[4] or the Soil Enrichment Protocol[5]).
- The inclusion of nitrous oxide emissions in the project's carbon accounting.

In addition, we identify a number of activities that the project could employ to mitigate risk. For ease of understanding, we have grouped these by theme, however implementation may have wider effects on the overall rating.

Project boundaries

- Record the boundaries of each field where the project is operating, and make these available as a shapefile. These project boundaries should also be associated with the farmer and the size of the total farm enrolled.
- Disclose relevant characteristics of the land on which the project is operating, including but not limited to prior land use, land tenure, whether the farm is commercial or smallholder, and the prior irrigation system.

Additionality

- Justify additionality through detailed additionality tests. This may include a common practice analysis using national data and a specified threshold at which common practice is breached. Additionality may also be justified through an investment analysis, to demonstrate the requirement for carbon finance. In any instance, the data and justification for these additionality tests should be disclosed.
- Disclose more information on the project's benefit-sharing mechanism. For example, the percentage of revenue to be provided to farmers, how the revenue will be delivered, and the value of the payments made to farmers.

Carbon accounting

- Include both nitrous oxide and carbon dioxide emissions in the project's carbon accounting under the baseline and project scenario. The inclusion of these greenhouse gases (GHG) is required to calculate the net climate benefit of AWD.

- Conduct in-situ monitoring instead of using default emission factors to determine GHG emissions from the baseline and project scenario. In-situ monitoring is likely to be the most accurate method of measuring GHG emissions from the baseline and project scenario, and will account for variations in climate, soil texture, and rice cultivar which may affect GHG emissions. Where sampling is used to extrapolate GHG emissions across the project area, this must be based on robust stratification to ensure that environmental variation is accounted for. If default emission factors have to be used, these should be as location specific as possible to increase accuracy.

- Disclose more information on any independent monitoring to verify the implementation of project activities. While verification is expected to include site visits by a third-party verification body, project documents currently do not detail the scope or frequency of this process. Although the project requires time-stamped photos uploaded to a web app to demonstrate changes in water regime, the project itself does not undertake additional on-site verification. To mitigate risk associated with this approach, the project should undertake further monitoring efforts to ensure that project activities are consistently implemented accurately, or provide information about monitoring efforts if they are already under way. Effective monitoring techniques could include site visits or the use of remote sensing to monitor activities.

Project execution risk

- Operational and financial risk may be reduced through the disclosure of more quantitative detail on the project's operational and financial plan. While the PDD includes high-level information on implementing entities, rollout timelines, and area targets, greater transparency on cost structures and projected carbon revenues would further reduce execution risk.

2. BeZero Carbon ex ante carbon risk assessment

2.1 Additionality

BeZero Carbon is of the opinion that once the project reaches operational stability, credits issued by 5001 are likely to face low additionality risk. This assessment is driven by the project's benefit-sharing mechanisms and the presence of technical barriers that are overcome with carbon finance. This view is also supported by limited policy support and project activities not being common practice.

The implementation of alternate wetting and drying (AWD) is unlikely to be common practice, bolstering additionality. In accordance with the methodology, project activities are only eligible to occur on irrigated fields [6]. Rice production in Ghana is largely dependent on rain-fed agriculture, with only 3.18% of cultivated land under irrigation in 2022 [7]. The Irrigation Policy of Ghana considers there to be three main types of irrigation: 1) formal irrigation schemes that are owned or managed by the government [8], historically depending on foreign finance [9,10], (2) commercial irrigation schemes that include hydraulic infrastructure (such as dams and weirs) developed by commercial farmers, and (3) informal irrigation schemes that are micro-scale irrigation infrastructure, usually self-initiated and managed [8]. Despite the importance of irrigation in modernising agriculture and increasing resilience, irrigation schemes in Ghana have been underutilised, historically operating at 30% of their design capacity [11]. Other barriers to irrigation include high costs, inefficient use of water in formal irrigation facilities, and limited skill and knowledge in irrigation farming [8]. Limited access to irrigation and poor water management have been identified as contributing factors to low productivity in rice yield [8]. Water availability has also been cited as a major barrier to rice cultivation in south-east Ghana, even where irrigation schemes are in place[12]. Therefore, we find it likely that rice irrigation is not common practice in Ghana.

There is limited information available to determine the common practice of continuous flooding or AWD in irrigated rice fields. Project documents state that it determined its low common practice status through a government survey, however this survey is not publicly available. However, since 2018, Lancaster University and the CSIR-Crops Research Institute have evaluated AWD technology for rice production in Ghana [13], and have reported that farmers across rice-growing regions of north Ghana are using the technology, but that mass dissemination would boost rice production across the country [14]. This partnership resulted in the introduction of AWD in 2023 according to news reports [15,16]. In another project, the CSIR-Crops Research Institute and the International Water Management Institute delivered a capacity-building programme in 2023 for AWD, which provided training to 20 participants in the Kumbungu district[17]. Therefore, whilst AWD is practised in Ghana, particularly in the northern region, the presence of programmes and capacity workshops in 2023, a year after the project began in 2022, suggests that AWD is not common practice, however this has limited weight in our analysis due to a lack of information.

Barriers are likely to limit the implementation of AWD in the absence of project activities. A 2019 study investigating the adoption of AWD by farmers in Tema, Ghana, found that farmers were more likely to adopt AWD if they had larger farms, more farming experience, and greater awareness of climate smart agriculture and AWD itself [18]. However, even when AWD was adopted, implementation was considered to be 'not accurate' for 55% of farmers [18]. This provides evidence that adopting AWD is technically challenging, and even when barriers to uptake are overcome, correct implementation with the expected climate benefits may require further technical support. The project plans to overcome technical barriers through providing training and support for all the stages of implementing a system of rice intensification (SRI), including AWD. Farmers are informed on when to start and stop irrigation, and what the benefits of this will be. As of April 2024, the project has enrolled 8,200 hectares. The project does not disclose the proportion of these that are commercial or smallholder farms, however a report by Ghana's Carbon Market Office states that a further 21,000 hectares may be added to the project from commercial farms [19]. These farms are likely to have greater access to resources to implement AWD independent of carbon finance, however we are of the opinion that the technical

support provided by the project may mitigate this risk. Therefore, we find that the project activities are likely to overcome technical barriers.

Carbon finance may also be required to overcome financial barriers. Although information specific to AWD is limited, an analysis of SRI in the Volta region of Ghana found that both labour availability and cost were barriers to adoption [20]. Farmers are unlikely to have access to affordable credit, as an in-situ study of barriers to rice cultivation in south-east Ghana found that farmers depended largely on informal sources of credit that can be costly, with interest rates at 22.5%[12]. In addition, the impact of AWD on yield is extremely variable, which could disincentive farmers. A meta-analysis of 41 studies across Asia found that implementing AWD reduced yield by an average of 3% [21]. However, the implementation of SRI alongside AWD is likely to mitigate this potential loss of income, and may lead to increased yields through improved productivity. A study that compared good agricultural practices (that are comparable to SRI) in rice fields in Ghana found that when combined with AWD, these practices raised yields by 13% [22]. In addition to technical support, the project will provide payments to farmers based on the tCO_2e avoided per hectare [23]. Whilst we do not know the value of these payments, this may be sufficient to provide a financial incentive for farmers to participate in the project, and help to alleviate concerns over the impact of changing practices on yield.

The project has established benefit-sharing mechanisms, reducing risk to additionality. Project-defined benefit sharing bolsters additionality. According to project documents, 47% of revenue from carbon finance will be distributed to farmers through direct financial incentives, training, monitoring support, and consultations. Whilst the exact proportion of revenue that will be passed on as direct financial incentives is undisclosed, the onboarding form states that farmers will receive carbon revenue relative to the size of their land, which relates to the tCO_2e avoided. We consider benefit sharing to support additionality.

Carbon finance can help to overcome investment risk posed by national economic classifications. Investment in Ghana is currently considered to be 'extremely speculative' and 'in default' by the two credit rating agencies that have rated the country (Table 1). The identified investment risk improves the additionality of the project, in our view, as the macro policy perspective would otherwise limit the level of investment in the country, without the addition of carbon finance revenues.

Table 1. Ghana's credit rating as of 28 May 2024 [24].

Agency	Credit rating	Outlook
Moody's	Ca	Stable
S&P	SD	N/A

The project's baseline is appropriate, reducing additionality risk. The project applies a baseline of continuous flooding in the absence of project activities. We identify two other alternative scenarios in the absence of the project: the adoption of AWD without the intervention of carbon finance , or land use change.

Independent of carbon finance, incentives to adopt AWD include increased water efficiency. Implementing AWD may reduce water use by up to 30% without reducing yield (although this is highly variable) [25]. However, irrigation schemes are government led in Ghana, and are often not managed to capacity [11,12], with farmers also facing barriers to credit which could fund improvements in irrigation [12]. Whilst farmers may introduce AWD independently to avoid water use, there are limited incentives for them to do this whilst using larger infrastructure. Furthermore, AWD is technically challenging [18], and such barriers are likely to limit independent adoption; this is discussed further in the Barriers to Adoption section.

Land use may also change, either to another agricultural output or conversion from cropland. However, in our opinion, farmers are unlikely to convert from rice to another agricultural output.

Ghana is a net importer of rice [8], despite a consistent growth in rice production over the past 10 years [26,27] due to increases in areas under cultivation and increasing yields [26]. This may be due to Ghana's increasing population, which grew from 19.7 million in 2000 to 33.5 million in 2022 [28]. As the area under rice cultivation has increased since 2014 [26](Figure 1), alongside increasing prices for domestic rice [29], this suggests that there is growing demand for rice cultivation, and land therefore unlikely to be converted to other forms of agriculture. In addition, the project is operating on irrigated rice fields which experience higher productivity than non-irrigated rice fields [30], which will likely disincentive conversion to another land use. Agricultural abandonment could result in land use conversion, or a decline in rice production. Farmers without access to credit [31], small farm sizes, and low farm income were some of the drivers behind farm abandonment. However, across Ghana, agricultural land has remained relatively constant, increasing between 1995 and 2015 relative to 1995, and only decreasing by 1.5% in 2019 [32], suggesting that land abandonment is an unlikely alternative scenario.

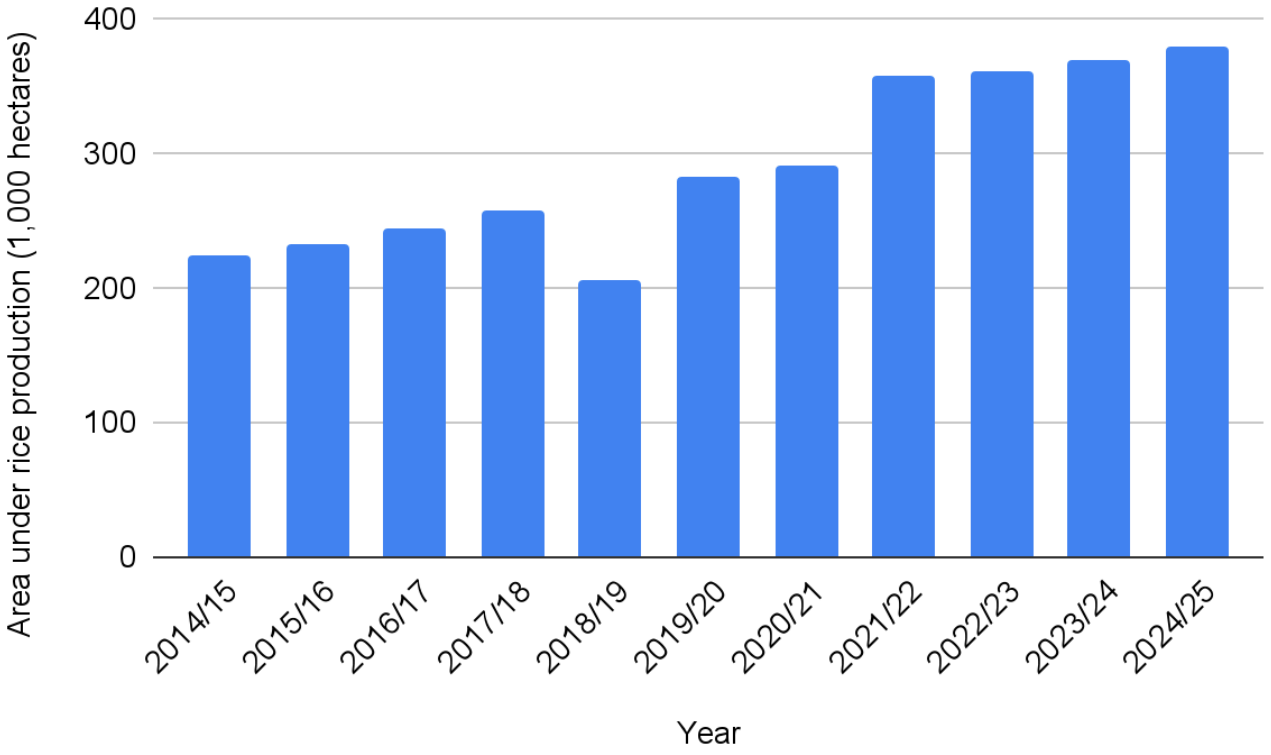

Figure 1. Area under rice cultivation in Ghana [26] .

Although we consider the project's baseline to be appropriate, we note that there is limited evidence to confirm the baseline before project activities. Prior water management is self reported, and therefore cannot be independently verified. In addition, we do not have access to the project boundaries, and as such we are unable to independently verify whether continuous flooding was in place before the project activities commenced. Despite this uncertainty, on balance we consider that continuous flooding is a suitable baseline scenario.

The project activities are surplus to Ghana's nationally determined contribution (NDC), bolstering additionality. Ghana's NDC excludes emissions from agriculture due to the vulnerability of Ghanaian food systems (classified as rain fed and unmechanised). It is also excluded as agriculture is the main source of livelihood support for the rural economy. Although widespread AWD implementation may reduce emissions reductions from the agricultural sector, as it is not mandated by Ghana's NDC, we consider this to bolster additionality.

Substantial policy support to increase rice production is mitigated by policy ineffectiveness. Rice is an important staple crop in Ghana, and is cultivated across all agro ecological zones in the country

[29]. Intensification of rice production is necessary in Ghana, where a deficit in rice production has resulted in high dependency on imports [27]. Sustainable agricultural practices are necessary to achieve this increase in rice production without a large increase in GHG and resource use [27]. This is challenging in Ghana due to a lack of adequate investment in the agricultural sector, and the high percentage of stakeholders who employ rudimentary farming practices [27]. The production of rice in Ghana has steadily increased over the past 10 years (Figure 2), however Ghana is heavily reliant on rice imports. Between 2012 and 2018, imported rice made up over 50% of the domestic rice market [29]. Therefore, increasing rice production to the point of self sufficiency is an important policy goal [33]. To increase food security, there have been several international and national agricultural policies implemented to promote agricultural growth and investment [34]. The Coalition for African Rice Development is a policy framework which aimed to double rice production between 2008 and 2018 [35]; Ghana was one of only seven countries that achieved this aim [35]. Nationally, policies include the Food and Agriculture Sector Development Policy, the Medium Term Agricultural Investment Plan, and the Ghana Shared Growth and Development Agenda II which highlighted national agricultural development [34]. These national policies include measures such as improving access to irrigation and mechanisation [36]. Specific to the rice sector, the National Rice Development Strategy was designed to double rice production in Ghana, specifically to reduce food insecurity and poverty [34]. Ghana was successful in doubling rice production between 2008 and 2018, and has seen a continued growth in production from 2010 to 2021 (Figure 2), however this was achieved through both area expansion and increases in productivity, rather than improvements in productivity alone [33,37]. In 2022, rice imports (amongst other goods) were restricted to revitalise the Ghanaian economy and reduce the country's dependencies on imports [38]. Therefore, there is a history of policy support for rice production in Ghana, and consequently irrigation infrastructure is largely provided by the government [10,39].

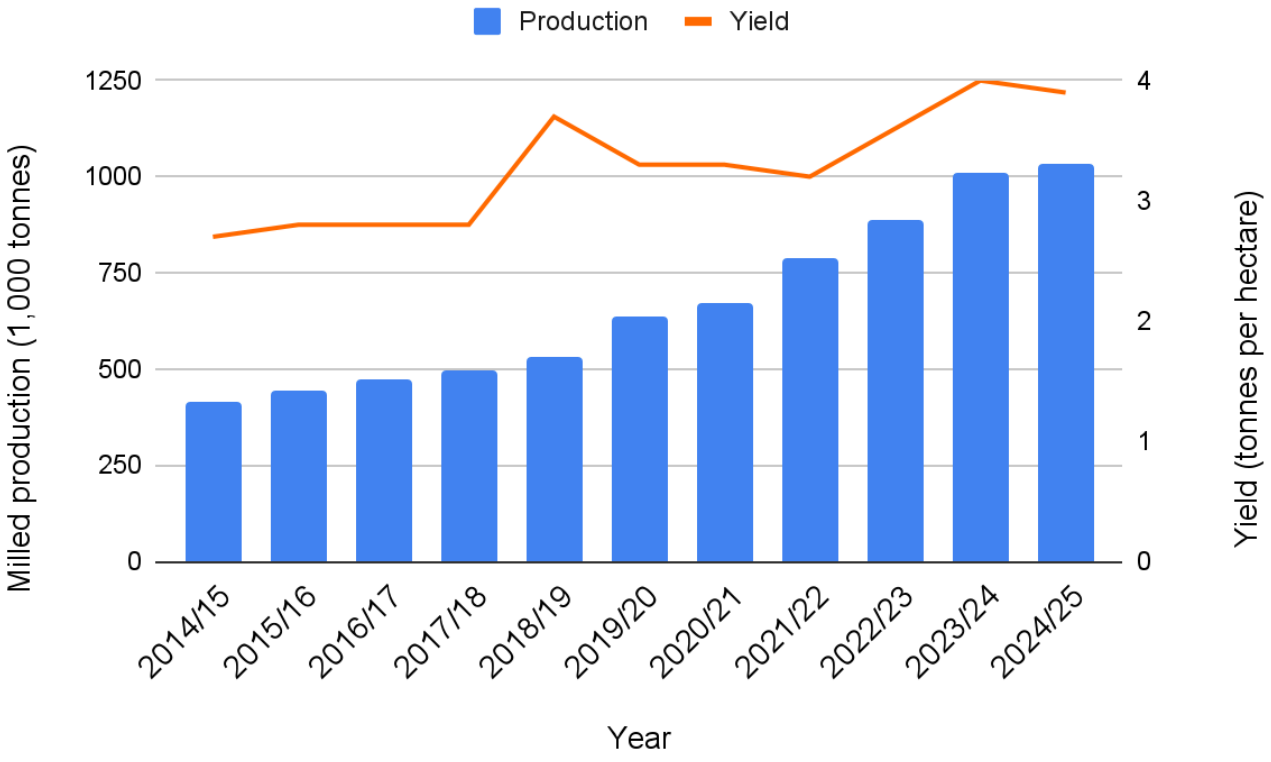

Figure 2. Production quantity of rice in Ghana between 2014 and 2024.

Despite this, these policies have not been sufficient to increase rice production to the point of self sufficiency. In 2023, Ghana imported 810,000 tonnes of rice, relative to a total production of 885,000 tonnes of rice in the 2022/23 financial year [37]. There are also limited policies in place to support AWD. The focus on increasing rice production may overlap with SRI, however these policies do not explicitly relate to changes in water management, which is the activity that drives credit issuance for this

project. The 2007 National Water Policy states that the government will promote and encourage water use efficiency techniques in agriculture to achieve food security, but makes no specific recommendations for rice production. We also consider that the lack of policy support for the project activities specifically meets the criteria in the bilateral agreement that the activity should 'give due consideration to relevant existing and planned national policies and legislation', as there are no explicit policies that mandate project activities. Overall, whilst there are several policies that aim to improve rice production, they have had limited effect on increasing productivity, and there is no specific mention of AWD. Therefore, we consider risk to be minimal in this regard.

We consider the project's applied additionality tests to be limited in scope. The Clean Development Mechanism methodology AMS-III.AU used by the project is for small-scale activities, and as such, does not require projects to undergo a defined additionality test. To meet the small-scale criteria, the project's aggregated annual emissions must be under 60,000 tCO_2e [6]. The project's estimated issuance exceeds this criteria, ranging between 110,848 to 159,622 tCO_2e per year, suggesting that additionality conferred by the use of a small-scale methodology may not be appropriate. In addition, the methodology used has been inactivated by a major standards body due to concerns regarding insufficient guidance for stratification, the exclusion of nitrous oxide and soil organic carbon stocks, and the absence of standardised guidance for conducting methane measurements [2].

The project claims to demonstrate additionality in two ways. Firstly, the project states that the Internationally Transferrable Mitigation Outcome (ITMO) programme is not included in the conditional or the unconditional NDC, and is therefore additional to Ghana's NDC. Secondly, the project uses a common practice test when enrolling farmers to conclude that the project activities are not common practice. The implications of additionality risk are explored below, however, we are unable to assess the appropriateness of this common practice test due to the unavailability of the dataset used and the threshold that the project uses to assess common practice. Overall, we consider the project's justification of additionality to be limited.

Limited evidence of project implementation increases additionality risk. In accordance with the methodology, the implementation of project activities is reported by farmers and verified through time-stamped photos of changes in water regime. However, the project does not specify independent monitoring procedures in its documentation, including the scope and implementation of verification activities, which limits our ability to assess whether project activities are being implemented as intended. Whilst the project has been ongoing since 2022 with 8,200 hectares currently enrolled, we consider the lack of independent verification to raise additionality risk, as it creates uncertainty regarding the effectiveness of the project. This uncertainty is compounded by the inactivation of the methodology by a major standards body [2], and by the fact that the project proponent has not confirmed the project boundaries, which prevents us from independently assessing project implementation.

Additionality conclusion

In our view, the project faces low risk to additionality. This view is driven by the technical barriers to project activities and the fact that such activities are not common practice. Furthermore, we believe that the project has correctly identified the most likely baseline land use scenario. Although the project exists in a relatively supportive policy environment, ineffective policy implementation mitigates risk. However, the adoption of a small-scale methodology for large-scale activities increases risk.

2.2 Carbon accounting

BeZero Carbon is of the opinion that credits issued by 5001 face very high risk in relation to carbon accounting. This view is based on the project's use of emissions factors derived from default values for the first half of the crediting period. Risk is also introduced by the exclusion of nitrous oxide and carbon dioxide emissions from the project's carbon accounting, as well as the limited disclosure of in-situ independent monitoring arrangements to verify project activities, which may result in the project's climate benefit being overstated. However, this risk is mitigated by the use of a conservative global warming potential and very low risk of both activity shifting and market leakage.

The project does not monitor changes in nitrous oxide and carbon dioxide. Credit issuance is based on the methane emissions avoided by introducing alternate wetting and drying (AWD) to replace the practice of continuous flooding. Flooding reduces oxygen in the soil to create anaerobic conditions, which results in the production of methane due to the presence of anaerobic bacteria. Removing floodwater, for example through introducing AWD, changes soil conditions from anaerobic to aerobic, which inhibits production of methane from anaerobic bacteria [40]. However, aerobic conditions also enhance the process of nitrification, resulting in an increase in nitrous oxide due to AWD [41]. In addition, AWD will also influence carbon dioxide emissions, although there is limited research into this phenomena [21]. Therefore, the climate benefit achieved from avoiding methane emissions due to project activities will be partially offset by nitrous oxide and carbon dioxide emissions [21], which the project does not account for.

Nitrous oxide's 100-year global warming potential is 273, more than nine times that of methane [42]. The impact of AWD on nitrous oxide in Ghana's rice fields is uncertain due to limited research, however this process has been investigated extensively in other countries. A review of 41 studies researching greenhouse gas (GHG) emissions from continuous flooding and AWD in Asia, North and South America, and Europe found that nitrous oxide emissions increased from 1.36 kg per hectare under continuous flooding, to 2.19 kg per hectare under AWD [21]. These values cannot be directly applied to this project as none of the included studies were conducted in Africa, however we consider this to provide evidence that the project's carbon benefit may be overestimated if nitrous oxide is not accounted for.

The impact of CO_2 on the climate benefit of AWD is unclear. In the review of 41 studies investigating the effects of AWD in rice agriculture mentioned above, only seven measured the impact on CO_2 emissions [21]. Furthermore, as mentioned previously, none of these seven studies were located in Ghana, or even in the continent of Africa. However, a meta-analysis of 41 studies in Asia, Europe, and North and South America found that although the implementation of AWD did provide a climate benefit, this benefit was reduced when all GHG emissions were considered. Specifically, CO_2e emissions per hectare were reduced by 49% through AWD when methane and nitrous oxide emissions were considered, but this dropped to 30% reduction in CO_2e emissions per hectare when carbon dioxide was included alongside methane and nitrous oxide [21] (Figure 3). However, it is important to note that there was considerable variation in carbon dioxide emissions from AWD relative to conventional irrigation, with some studies finding an increase in carbon dioxide emissions under AWD [43–45], and other studies finding a decrease [46], highlighting the importance of location-specific monitoring.

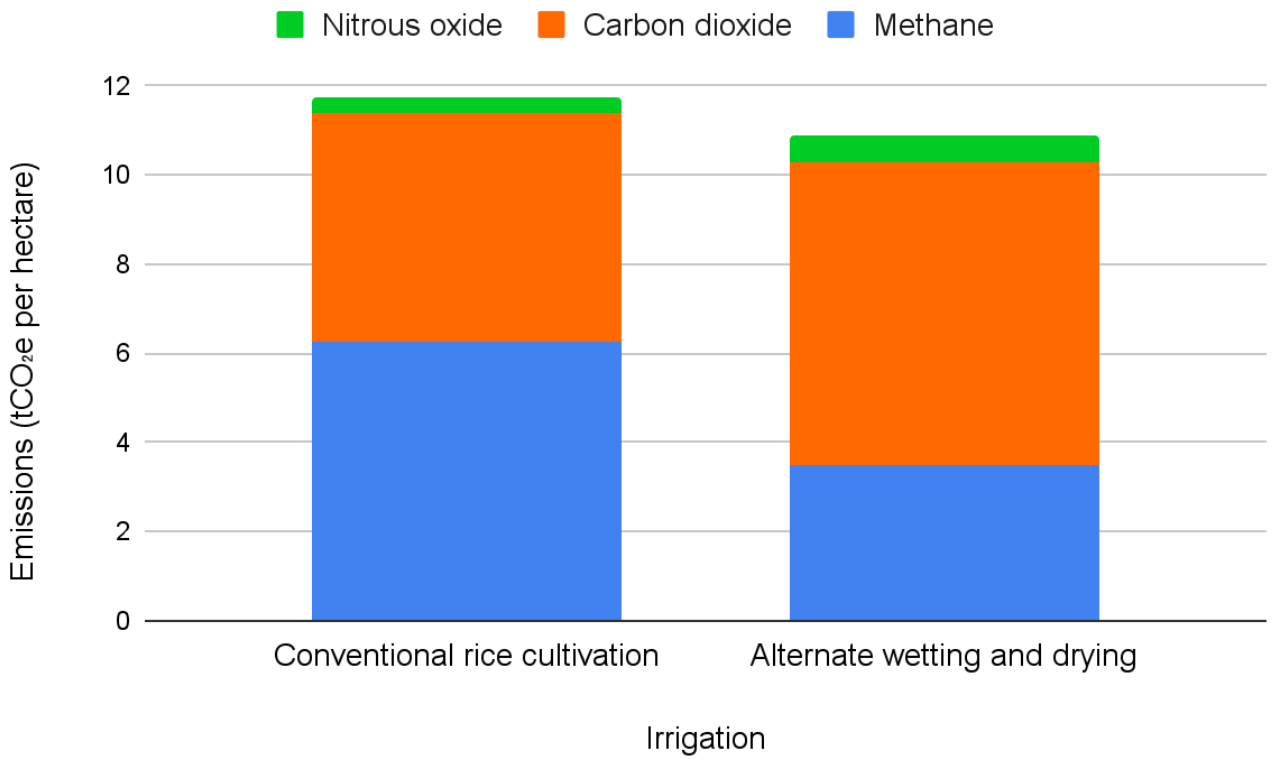

Figure 3. Mean emissions in tonnes of CO_2e per hectare in conventional rice cultivation and AWD, according to a review of rice cultivation practices in a global meta-analysis of 41 studies [21]. Methane and nitrous oxide emissions were averaged over 41 studies, and carbon dioxide emissions were averaged over seven studies. Emissions were converted to tCO_2e per hectare using global warming factors of 27.9 for methane and 273 for nitrous oxide [42].

Overall, whilst it is well established in the literature that AWD provides a climate benefit, this benefit may be overestimated if nitrous oxide and carbon dioxide are not accounted for. For example, if methane alone is considered, 44% of emissions could be claimed as avoided (6.3 tCO_2e per hectare under continuous flooding decreasing to 3.5 tCO_2e per hectare under AWD) [21]. In contrast, if methane, nitrous oxide, and carbon dioxide emissions are considered, only 7% of emissions could be claimed as avoided (11.75 tCO_2e per hectare under continuous flooding decreasing to 10.88 tCO_2e per hectare under alternative wetting and drying)[21]. Therefore, we consider the project's exclusion of nitrous oxide and carbon from its accounting to increase risk.

Emission factors derived from default values increase carbon accounting risk. To calculate avoided emissions from AWD, the project will utilise two methods. For the first half of the crediting period (from 1 June 2022 to the first cropping season of 2026), the project will use the IPCC Tier 1 method to determine the baseline and project emissions (Option 1 of the CDM methodology AMS-III.AU v4). For the second half of the crediting period (from the first cropping period of 2026 to 31 December 2030), the project will use reference fields to measure methane emissions.

We consider the IPCC Tier 1 method to introduce uncertainty to the project's carbon accounting. The project calculates the emission reduction factor through subtracting the project emission factor from the baseline emission factor, both of which are adjusted for organic amendments and differences in water regime during the pre-season and the cultivation period. However, emission factors are considered to be most useful when they are location specific [27]. For example, although we do not have specific project locations, our analysis of soil characteristics across the eight regions where the project is operating shows great variation, demonstrating that site-specific analysis is likely to be required. Emissions from rice paddies are affected by a number of different factors, including:

- Water regime: Alternate wetting and drying may reduce methane emissions by as much as 38% when compared to continuous flooding [47].
- Soil texture: There is great variation in methane emissions depending on soil texture, with moderately fine soil emitting almost twice as much methane as fine textured soils [47].
- Organic amendment: For all amendment types, methane emissions tend to increase with the amount added. The highest methane emissions are emitted from straw on season and green manure, with biochar producing the lowest methane emissions [47].
- Organic matter: Soil organic matter accumulated from past crops is likely to facilitate methanogenesis [48].
- Plant characteristics: The rice cultivar used may affect methane production, as traits such as root biomass, shoot architecture, and aerenchyma influence methane emissions [49].

Whilst the project will control some of these variables (in particular water regime and organic amendments), the number of factors that affect methane emissions in rice cultivation are unlikely to be captured by the use of default values.

The project's decision to use general default values to estimate avoided emissions may not be representative of its total climate impact. The IPCC default values used by the project are not based on a global estimate due to a lack of data [50]. In relation to rice cultivation, the emission factors applied by the project may be underestimating methane emissions. The project applies an emission factor of 1.34 kg CH_4 ha^{-1} day^{-1} for the baseline scenario of continuous flooding in a single cropping system. In contrast, an estimated emission factor of 2.54 kg CH_4 ha^{-1} day^{-1} has been proposed for the comparable Ghanan rice systems by a modelling study [47], which incorporated controlling variables such as water regime, soil texture, and organic amendments. This suggests that the project may be underestimating emissions. However, Nikolaisen et al (2023)[47] state that the estimated emission factor of 2.54 kg CH_4 ha^{-1} day^{-1} is based on a small sample size of five data points, with an unknown pre-season water status, which increases uncertainty. Further, our ability to quantify the difference between the project-applied IPCC default values and in-situ measurements for Ghana's rice production is severely limited by a lack of research on the contribution of African rice cultivation systems to greenhouse gas emissions.

Default emission factors are unlikely to be representative of the environmental characteristics that may affect methane emissions in countries such as Ghana that are underrepresented in the research literature [27,51]. For example, in a review of greenhouse gas emissions in natural and agricultural lands in sub-Saharan Africa, only two studies provided data on emissions from rice paddies, located in Kenya and Zimbabwe [51]. Further, a meta-analysis of 41 papers investigating GHG emissions from continuous flooding and AWD did not include any countries in Africa, instead dominated by Asian countries including China and India [21]. Factors that affect methane emissions such as climate, soil texture, and vegetation are unlikely to be represented accurately in default emission factors that are not country specific.

Due to the uncertainty associated with default emission factors, the project applies an uncertainty discount of 11% to all avoided emissions. Whilst this does reduce the risk, we do not consider this deduction to be sufficient to account for all uncertainty from this method, for the reasons outlined above. Therefore, we consider the project's use of default emission factors to introduce uncertainty and to increase risk.

Uncertainty in the monitoring conducted by the project increases risk. The project's monitoring plan requires all participating farmers to input monitoring information into a digital platform via web apps. This data will be compiled by the Ghana Environmental Protection Agency (VAL pg 30). Time-stamped photos of changes in water regime are used to verify project activities. Monitoring data will therefore be available from all farmers rather than a subset, which we consider to be good practice. While third-party verification is expected to include site visits, project documents do not provide detail on the scope or frequency of this process. In the absence of clearly defined independent monitoring protocols, risk remains elevated, although the project aims to mitigate this risk through training and technical assistance. Nonetheless, we are of the opinion that some risk

remains, as a study of 120 rice farmers in Tema, Ghana found that half of the farmers implemented AWD technology inaccurately [52]. If project activities are not implemented accurately, the climate benefit may be less than expected, increasing risk.

In the second half of the project's crediting period, the project aims to implement a reference field approach instead of using default emission factors, although there is insufficient information available to assess risk associated with the reference field approach that the project will use. The implementation plan for this approach is not yet defined, however the minimum requirements of the methodology include at least three reference fields for each group of fields within the same cultivation pattern [6]. The baseline emission factor will be derived from an average value from the three measurements for each group [6]. It is likely that this will lead to a more reliable estimation of emission avoidance than the approach of using default emission factors as it will provide local and regional information. However, the stratification of the project by group and the corresponding location of the reference fields will influence carbon accounting risk. Some variables that affect methane emissions from rice cultivation, such as fertiliser input [53], will be controlled by the project. However, environmental variables, such as climate [47,54], may require stratification to ensure that measurements are representative.

The project has correctly identified the baseline scenario. In the absence of project activities, the baseline scenario has been identified as the continuation of current rice irrigation practices, specifically continuous flooding. We identify the agents and drivers of land use change as the farmers within the project area. Whilst there are natural influences on the land use in the region such as climatic events and climate change, the impact of these factors is likely to be limited , and will to some extent be influenced by the response of the landowners. Furthermore, the project activities aim to influence management practices, with the primary land use remaining in line with the pre-project land use, limiting the impact of other external and natural influences. Therefore, we find the baseline scenario to be appropriate.

The Global Warming Potential for methane (GWP_{CH4}) applied by the project is conservative. The IPCC's 'The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity' report provides a GWP_{CH4} of 27.9 over a 100-year time period [42]. The project applied a GWP_{CH4} value of 25. Therefore, the project is likely to be under-estimating its avoided emissions, as it is using a conservative value, which reduces risk.

There is very little leakage risk faced by this project. In accordance with the methodology, the project does not make issuance deductions for leakage. We consider this to be appropriate due to the low likelihood of leakage.

There is very low risk of activity displacement due to the continuation of pre-project activities. Rice cultivation will continue under the project, with only the management activities changing. Therefore, land conversion is unlikely to occur due to project activities. The impact of AWD on rice yield is uncertain, with an analysis of 41 studies reporting changes in yield ranging from an 11% increase to a 36% decrease [21]. However, in-situ experiments from the Soil and Irrigation Research Centre of the University of Ghana, showed that alternative wetting and drying did not significantly decrease rice growth or yield [55,56]. Furthermore, the project implements AWD as part of SRI activities, which have been shown to largely increase rice yields [45]. Therefore, it is unlikely that rice cultivation will be displaced to account for lost yields as a result of project activities.

There is limited risk of market leakage from project activities. As discussed above, the project is likely to maintain or increase rice yields. Furthermore, Ghana is a net importer of rice [29], so any increase in rice yield will likely be utilised to meet domestic demand.

Carbon accounting conclusion

In our view, this project faces very high carbon accounting risk due to the use of default emission factors, which may not be representative of the project area. Furthermore, the project does not account for emissions from nitrous oxide nor carbon dioxide, introducing further risk. However, risk is reduced through the project's selection of an appropriate baseline and very low leakage risk.

2.1.3 Permanence

BeZero Carbon is of the opinion that over the project's eight-year crediting period, credits issued by 5001 demonstrate the highest likelihood of permanence. The emissions avoided by the project face no technical risk of reversal due to the nature of the project activities. Once AWD has been implemented, the avoided greenhouse gases cannot be reversed. If the project activity cannot be implemented, for example through stakeholder withdrawal, this would affect future issuance, not the credits that have been issued.

Buffer pool contributions are not required as there is no technical risk of reversal. In accordance with the methodology, the project does not make any buffer pool contributions. We consider this to be appropriate as we find there to be no technical risk of reversal.

Permanence conclusion

We believe that 5001 faces the highest likelihood of permanence as there is no technical risk of reversal once a credit has been issued.

2.1.4 Information risk

We define information risk as the risk posed to our assessment of a project's carbon efficacy by the reliability or robustness of the information available to carry out such an assessment. A project's commitment and enforceability would be significantly linked to the reliability of the information used.

Our assessment of information risk is informed by the degree of available data provision, its quality, and its sources, from both a top-down perspective and project-specific assessment.

Based on the level of detail of information provided by the project developer, we believe that this project faces **very high** information risk.

The following highlights areas of information disclosure where missing data may have impacted our assessment or increased uncertainty. Information risk for this project includes:

Information that has not been disclosed:

- The justification for selecting the methodology chosen by the project (AMS-III.AU.: Methane emission reduction by adjusted water management practice in rice cultivation), which has been permanently inactivated by a major carbon offset registry [2] due to concerns regarding:
    - Insufficient guidance for field stratification
    - Lack of consideration, accounting, or monitoring for changes in nitrous oxide emissions and soil organic carbon stocks
    - Absence of standardised guidance for conducting methane measurements
- Clarity on the project's benefit-sharing mechanisms, specifically the percentage of revenue that will be delivered directly to farmers
- The dataset used to justify that project activities are not common practice, and the threshold considered for common practice

- The project's financial plan for implementation, and the certainty of finance under the project's bilateral agreement
- The cost of implementing project activities, and the expected role of carbon finance in overcoming any such implementation barriers

Information that may not have been collected:

- Information on the project boundaries, which would increase our ability to:
    - Assess prior land use
    - Determine common practice
    - Evaluate the implementation of project activities
- The prior land use of areas where the project is occurring, specifically:
    - Access to irrigation infrastructure before the project activities
    - The proportion of the project area occurring on smallholder land or commercial farms
- The location and number of measurements made to estimate emissions using reference measurements from the first cropping period of 2026
- The land tenure of project activities

2.2 Project execution risk

In the BeZero Carbon ex ante Rating, projects that are in either the design or implementation stage must be assessed for the likelihood of achieving full implementation and stable operational status.

Execution risk is assessed at the project level and applied as a discount factor to the standalone carbon rating. For a project to be executed, the following risks need to be analysed:

Table 2. Methodological summary for our assessment of project execution risk.

Technical risk	Refers to the risk that the project's chosen technology, design, and configuration may not work as planned.
Project proponent past experience risk	An assessment of the project proponent's background and past experience is a critical component of our assessment of implementation risk. A new, inexperienced project proponent will increase project risk as compared to an experienced project proponent.
Financial risk	Refers to the risk that a project may not be implemented or operate as planned if it has not secured adequate funding.
Legal and regulatory risk	Encompasses risk to the project from current and evolving regulations, government policies, the permissions/licences required, rights over the project land etc.
Operational risk	Refers to the risk associated with operating the project as planned, post-implementation. This is an equally important component of the project risk assessment, as a well-executed project that cannot operate efficiently renders the project infeasible.

Project execution risk: high risk

The BeZero Carbon ex ante risk assessment evaluates the risk that a project will fail to be implemented and become operational as planned.

On the whole, we are of the view that the project faces high project execution risk at this point in time. This assessment is driven by high operational risk as farmers may withdraw from the project, natural hazards such as drought and flooding, and the limited number of hectares enrolled in the project relative to the project's projection. Risk is exacerbated by high financial risk due to a lack of information. However, we consider risk to be somewhat reduced by the extensive past experience of the project proponents in delivering large-scale development projects and their technical expertise in alternate wetting and drying (AWD). We find little legal risk as the project requires farmers to transfer legal ownership of Internationally Transferred Mitigation Outcomes (ITMOs) to the project proponent and the high level of government support for this project. Technical risk is reduced as AWD is a well-established technology with a large amount of scientific research behind it, although the methodology chosen by the project introduces some risk.

The project faces high operational risk owing to the potential that landholders will withdraw from the project. The project activities aim to change the irrigation practices of rice farmers from continuous flooding to AWD. Therefore, project activities are entirely dependent on the cooperation of farmers; the withdrawal of farmers from the project therefore poses some operational risk.

The project aims to reduce this risk of withdrawal by requiring farmers to sign an onboarding form committing to project activities for the duration of the crediting period, for which they will receive finance for avoided tonnes of CO_2e based on their farm size. However, the proportion of carbon revenue that is shared with farmers is not disclosed, and the frequency of these payments is unclear. The onboarding form states that payments will be made seasonally and after third-party verification. The crediting period began in 2022, but the project is yet to undergo verification, suggesting that farmers may not have received payments. This could disincentive farmers from participating in the project. However, farmers may be encouraged to continue with the project activities due to greater productivity. Whilst AWD has variable effects on rice yields, the project implements AWD as part of SRI, which aims to increase rice yields and reduce resource use. SRI is likely to increase rice yields, including when combined with AWD [21]. Whilst this reduces the likelihood that farmers may withdraw from the project, we find that some risk remains.

We also find that there may be some risk introduced by how farmers implement project activities. Although the technology implemented is well established [21], it is technically challenging and farmers may not implement it accurately [18], reducing the climate benefit. The project aims to mitigate this risk through training and technical support, but a lack of independent monitoring increases risk; this is discussed further in this section.

Natural hazards may pose some operational risk. Rice cultivation in Ghana is vulnerable to natural hazards, such as drought and flooding. Our assessment of drought indices finds that all of the eight regions in which the project is planning to operate have experienced historical drought conditions. Meteorological drought occurred nationwide in 1983, 1992, and 2001, as average precipitation fell below 900m [57], causing widespread crop failure. This may have particular effect on water deficit areas such as northern Ghana as opposed to southern Ghana which is wetter [57], although we acknowledge that project activities will provide some resilience to drought as it increases water efficiency. Water scarcity is expected to increase under climate change, increasing risk [57]. Rice production may also be prevented by flooding, to which Ghana is vulnerable [58]. Northern Ghana has seen increased frequency of floods, with major floods occurring in 2007, 2010, 2012, 2018, and 2019 due to heavy rains and spillage from dams [58]. Flooding directly and indirectly impacts food crops and induces food insecurity [58], and could therefore hamper the operation of project activities through preventing rice cultivation. Overall, we consider natural hazards to increase operational risk, although our ability to assess this risk in the project area specifically is limited as we do not have access to project boundaries.

Operational risk is also increased as the project has enrolled fewer farms than expected. The project planned to enrol 57,600 hectares over the first two years of the project (2022 and 2023). However, the project developer has confirmed that only 8,200 hectares were enrolled as of April 2024. It is not clear why enrolment has not reached the project's initial aims, but this may result in less land being enrolled than originally planned at the point of ITMO issuance, increasing operational risk. The scale of the project may have decreased since conception, as an 'Article 6 progress report' published by the Ghana Carbon Market Office states that the project is expected to involve 11,000 rice farmers on 20,000 hectares, with at least 21,000 hectares onboarded but not yet commencing development [19]. An 'Article 6 progress report' published by the Ghana Carbon Market Office in 2023 states that the first ITMO volume delivery is expected for Q3 2024, suggesting that the project is close to becoming fully operational. However, we consider risk to be increased as there has been no ITMO issuance for the first two years of project issuance since the crediting period began in 2022. When considered with the limitations of the project in monitoring the implementation of project activities (as discussed in Carbon Accounting), we consider this to raise operational risk.

We find further operational risk to be introduced by uncertainties in the financing of the project; this is discussed below.

We are of the opinion that the project faces high financial risk. Limited information in regard to the financial viability of the project raises risk. The project is one of several projects funded through a USD 42 million pay-for-results collaboration between the Swiss Federal Office for the Environment

and the United Nations Development Programme (UNDP) [59]. 5001 was one of the projects initially included within this agreement, alongside a solar project in Vanuatu. However, the USD 42 million agreement will support multiple projects and the specific costs of 5001 have not been disclosed. Therefore, we consider there to be information risk as to the financial viability of the project and the feasibility of operational success. Therefore, we conservatively consider there to be high financial risk to the project.

The extensive past experience of the project proponent and other entities reduces the execution risk faced by the project . Project activities are facilitated and carried out by a collaboration of organisations:

- The UNDP is responsible for:
    - Providing development services to the Ministry of Food and Agriculture and CSIR-Crops Research Institute (CCSIR-CRI) for capacity building
    - Facilitating the transfer of payments
    - Ensuring transparency of financial flows
- Ghana's Environmental Protection Agency (EPA) is responsible for:
    - Overall oversight and implementation governance
    - Leading the measurement, reporting, and verification (MRV) and ITMO programme
        - Delivering ITMO developmental support
        - Engaging national stakeholders
        - Reporting mitigation outcomes to the Ministry of Environment and transferring ITMOs to Switzerland
- The Ministry of Food and Agriculture (MOFA) and CSIR-Crops Research Institute is responsible for:
    - Conducting training for farmers
    - Applying AWD throughout the project's crediting period
    - Monitoring the application of AWD as per the monitoring plan
    - Sharing information with verifiers during the project's verification
    - Hosting site visits from EPA, UNDP, MOFA, and CSIR-CRI as required

The primary project proponent, the UNDP, was established in 1966 by the General Assembly of the United Nations to deliver development assistance, operating in 170 countries and territories [60]. It has been operating in Ghana since 1978 to deliver support around three programme clusters: democratic governance, sustainable development, and inclusive growth and development [61]. The UNDP has created the 'Carbon Payments for Development Facility', which is currency supporting seven countries through project implementation, technical assistance, and/or capacity development, including Ghana [62]. We consider the UNDP to be well placed to deliver developmental services for this project, reducing project execution risk.

Ghana's Environmental Protection Agency is the country's leading public body for protecting and improving the environment [63]. The EPA has extensive experience in monitoring compliance with environmental conditions in accordance with national and international regulations. For example, Ghana successfully controlled the use of ozone-depleting substances through the EPA's regular monitoring of their use, in accordance with the Montreal Protocol [64]. At the national level, monitoring to ensure compliance with environmental law is a core part of the EPA's activities. In 2019, the EPA monitored nearly 9,000 facilities across the country, finding that 43% were not conforming with laws and regulations [64]. We consider the EPA to have sufficient experience in monitoring and reporting to manage the MRV for 5001.

The CSIR-Crops Research Institute is a public research institution established in 1964 [65]. This is the largest of 13 institutes under the Council for Scientific and Industrial Research, and is mandated to develop and promote agricultural technologies related to food and industrial crops in Ghana [65]. CSIR-CRI has been involved with implementing AWD in Ghana in irrigation schemes, demonstration plots, and capacity-building workshops for farmers in collaboration with Lancaster University and the International Water Management Institute [14,17]. Therefore, CRI-CSIR has prior experience in delivering

AWD training to farmers in collaboration with international institutions. CSIR-CRI will deliver training with the Ministry of Food and Agriculture, which oversees the agriculture sector in Ghana, and aims to promote sustainable agriculture through research and technology development as well as provide support to farmers.[66]. We consider this experience to be sufficient to implement project activities, reducing project execution risk.

Overall, whilst the implementation of a novel programme potentially raises risk, it is our assessment that each of the project entities is well placed to deliver and support the implementation of the project, reducing project execution risk.

We find that the project faces little risk from a legal and regulatory perspective. As the project activities are occurring at the farm level, the ITMOs generated by AWD are legally owned by the farmers. Therefore, upon onboarding to the project, farmers agree to transfer legal ownership of the ITMOs to the EPA. Farmers also agree to participate in the project in return for receiving technical and financial benefits relative to avoided tonnes of CO_2e per hectare. Therefore, whilst the project does not own the land on which the project activities are occurring, we consider the actions taken by the project to mitigate this risk.

Ghana has a comprehensive regulatory framework regarding carbon markets and is widely considered to have one of the most mature regulatory frameworks for voluntary carbon markets in Africa, alongside Tanzania and South Africa [67]. In December 2022, Ghana released 'Ghana's framework on international carbon markets and non-market approaches', detailing the procedures of Article 6.2 of the Paris Agreement with operational information for Ghanaian carbon markets [68]. In addition, Ghana is leading Article 6.2 implementation, with government arrangements in place with Switzerland, Sweden, Singapore, South Korea, and Lichtenstein [67]. The maturity of Ghana's interaction with voluntary carbon markets decreases legal and regulatory risk for 5001.

We find that the project faces some technical risk despite a well-established technology. The implementation of AWD is well established at reducing methane emissions, with a large body of scientific evidence supporting this [21]. The technique is used globally, but is particularly well established in Asia where its use is widespread [21]. Therefore, provided that the project activities are implemented correctly, the AWD will successfully reduce methane emissions, reducing technical risk.

The project activities are relatively simple to implement, reducing risk. According to the methodology, the project area will be predominantly characterised by irrigated flooded fields, which are equipped with controlled irrigation and drainage facilities that allow the appropriate dry and flooded conditions to be established [6]. Therefore it is likely that the project activities will change management practices, not land use, which is simpler to implement. The only equipment beyond irrigation infrastructure that is required is a perforated 10 by 25 cm polyvinyl chloride tube which acts as an observation well. When the land has been prepared, the tube is inserted 15 to 20 cm into the soil. Irrigation should occur until the water is 5 cm above the soil surface, and be reapplied when there is no water remaining within the tube. The simple equipment used to implement AWD reduces technical risk, as the project is unlikely to be hampered by supply problems.

Engagement with all the relevant stakeholders reduces risk. The project is implemented by the Ghanaian government with support from the UNDP. Relevant government departments will engage with farmers and landholders to implement project activities, requiring their consent and commitment to engage with project activities before they are enrolled into the project. Furthermore, the project can only operate with the full cooperation of farmers, as they will conduct project activities. Training and technical support is provided by the project to ensure that farmers can provide suitable support.

Despite the well-established technology used by the project, some technical risk is raised by the methodology employed by the project. The 'AMS-III.AU.: Methane emission reduction by adjusted water management practice in rice cultivation' methodology has been permanently inactivated by a

major standards body [2]. Whilst it is well established that AWD does reduce methane emissions, the lack of guidance provided by the methodology in terms of stratification, methane measurements, and quantification of other greenhouse gas emissions could increase the technical risk faced by the project.

3. Negative impact risk

Summary analysis

Our assessment of this project suggests that the risk of negative impacts on people and the environment related to the BeZero-identified safeguards is likely to be **moderate to low**.

BeZero's definitions of high, moderate, and low safeguard risk are:

- High: Significant evidence that the safeguard is not effectively incorporated into the project design. Evidence may include no mention of the safeguard as part of the project design, inappropriate implementation of the safeguard, and a project design that breaches the safeguard.
- Moderate: Evidence that the safeguard may not be entirely effective. Evidence may include only partial incorporation of the safeguard into the project design and a safeguard design that is partially unclear.
- Low: Evidence that the safeguard is effectively incorporated into the project design. Evidence may include complete inclusion of the safeguard in the project design and a consideration of the project context as part of the safeguard's planned implementation.

BeZero analysts used the information provided in the project documents and that provided by the project proponent through the FOEN focal point to assess the risk that the project may have negative impacts that could have otherwise been mitigated through the effective implementation of safeguards. The assessment assumes that the project proponent follows through on the safeguards designs included in the project design document (PDD). See Table 3 for a list of the safeguards that BeZero evaluated and a high-level overview of the risk assessment. See Appendix A for the safeguard definitions.

BeZero's assessment found that the majority of the relevant safeguards (5/11) are at moderate risk of not being effectively implemented, 4/11 are low risk, and 1/11 are high risk. Only one environmental safeguard is relevant to the project as project activities do not require a change in the species used in traditional methods and the one relevant safeguard (12) is low risk. Thus, the social/economic safeguards are at the highest risk of not being effectively implemented.

The risk is primarily due to a vague integration of safeguards in the project design and specific plans for implementing and monitoring effective safeguard implementation. Overall, the safeguards risk is mitigated by the project proponent's planned implementation of the Climate Action Impact Tool (CAIT), which includes many safeguard-relevant questions [69] and the ITMO focal points in the Ghana Country Office that will provide support for sustainable development impacts. The CAIT does not require the implementation of certain safeguards but includes questions for the project proponent to consider regarding safeguards [69]. These questions may encourage the project proponent to develop more detailed plans for implementing related safeguards. In addition, the named ITMO focal points in the PD are no longer connected to the Ghana Country Office, and new focal points have not been identified to date [70]. The potential risks related to each BeZero-identified safeguard are detailed in the sections below.

Table 3. Summary of safeguard risks.

	Safeguard	Risk level	Key outstanding risks
1	Obtainment of free, prior, and informed consent (FPIC)	Moderate	The project design is not clear on the methods for obtaining consent.
2	Provision to prevent the displacement of people	N/A	N/A
3	Translation of project documents to local languages	Moderate	Project impact translation to local languages is not specified.
4	Involvement of Indigenous Peoples	N/A	N/A
5	Explicit legal recognition of communities' rights to carbon	Low	The translation of the onboarding consent forms to local languages is not clear.
6	Recognition of communities' land and resource rights	Low	None identified
7	Provision to respect labour rights and working conditions	Low	None identified
8	Formal feedback and grievance/redress mechanism	Moderate	The mechanism for submitting grievances and the process for resolving grievances is undefined.
9	MRV provisions regarding rights and safeguards	High	Monitoring of safeguards is not included in the project design.
10	Benefits sharing	Moderate	Details on the proportion of revenues shared is not clear.
11	Mechanism or provision to ensure gender equity	Moderate	Provisions to mitigate gender-based discrimination are not identified. Stated gender balance target appears to be lower than the national average gender split.
12	Provision to address pollutants and environmental contaminants	Low	Baseline pollution levels are not identified.
13	Use of multiple species for planting activities	N/A	N/A
14	Exclusion of Genetically Modified Organisms (GMOs)	N/A	N/A
15	Use of native species	N/A	N/A

Social and economic safeguards

The project's overall goal to empower Ghana's rice farmers inherently requires the project to implement strong social safeguards. The project aims to contribute to the eradication of extreme poverty and hunger through the rice methane project. The project will include farmer members of the Ghana Irrigation Development Authority Scheme located in the Greater Accra, Volta, Central, Shanati, Northern Upper East, and Upper West regions of Ghana [70].

The risk of negative social and economic impacts due to the ineffective implementation of related safeguards is mostly **moderate**, primarily due to information risk. The majority of social/economic safeguards lack clearly defined risk mitigation protocols in the project documents. For example, the stakeholder engagement process is not detailed in the project design document, increasing the risk that the process does not support the effective obtainment of free, prior, and informed consent [70].

3.1 Obtaining free, prior, and informed consent (FPIC)

There is a **moderate** risk that FPIC is not effectively obtained due to the minimal information in the project documents as to how consent will be obtained from stakeholders. The project proponent provided information outside of the project documents stating that farmers will first be informed of the project and those interested will sign an onboarding form. The onboarding form clearly outlines the objectives of the project and the project proponent's expectations of the participants. However, the process of distributing the form is not officially described in the project design document. It is unclear if the onboarding forms will be accessible to all participants (e.g. non-literate farmers) [71] and available in languages in which the participants are fluent. Nevertheless, the project does plan to answer the questions outlined in the CAIT which encourages adhering to United Nations Development Programme (UNDP) social and environmental screening, which includes seeking FPIC [69]. However, the results of the UNDP social and environmental screening were not shared.

Best practice would be to share in detail the project's planned stakeholder engagement process in the PDD or include the results of the stakeholder engagement process including identification of those who may participate in the project and related aggregated demographic information including age, gender, occupation, community/county, or other appropriate regional identifiers and the information shared about the project. It would also be best practice to share the planned project activities, the role of carbon markets, the objective, timeline, risks, and potential benefits for the community and environment [72].

In addition, it is advisable to include the plan or the results of seeking FPIC from the potential project participants in the project documents including the method of seeking consent (i.e. the languages the form is available in) and any other context regarding the consent process, such as a conversation or workshop that may precede the formal signing of consent.

3.2 Provision to prevent the displacement of people

This safeguard is likely **not relevant** for this project as the project activities involve changing the rice farming methods used on existing farms rather than developing new farms or replacing the current farmers [70]. In addition, the CAIT includes three questions that will prompt the project proponent to consider the potential risks of displacing people, though it is highly unlikely that the safeguard is relevant to this project [69].

3.3 Translation of project documents to local languages

According to the project proponent, there are six different languages in which local stakeholders are fluent, including English, Ga, Ga-Adangbe, Ewe, and Kassena. However, the project proponent did not provide clear information as to whether the project impacts have/will be translated/communicated in all the languages that potential project participants and impacted community members are fluent in,

thus there is a **moderate** risk that this safeguard is not effectively implemented. Outside of project documents, the project proponent shared that the project impacts are communicated in stakeholder meetings, training, and project briefs, but does not explicitly state in which languages. Best practice would be to provide translations of project impacts throughout the stakeholder engagement process as well providing onboarding forms translated into local languages [72].

3.4 Involvement of Indigenous Peoples

This safeguard is **not applicable**. The UNDP has informed BeZero outside of the PDDs that no Indigenous Peoples are located in the area. Best practice would be for the project proponent to note the number of Indigenous Peoples in the area, their general locations (i.e. county), and the potential ways that they may participate in the project in the publicly available project documents.

3.5 Explicit legal recognition of communities' rights to carbon

The risk that this safeguard will not be effectively implemented is **low** as the project proponent has expressed plans to secure the rights to carbon through the signing of an onboarding document. In project documents, the project proponent suggests that carbon rights will be transferred to the Environmental Protection Agency (EPA) when farmers agree to participate [70]. The onboarding document clearly lays out that signing the document means the project participant agrees to sign over their carbon rights. The CAIT also includes a question on whether there is a risk that rights-holders don't have the capacity to claim their rights [69]. Thus, the project proponent will likely investigate the capacity of the carbon rights holders, the farmers, to understand their carbon rights and what it means to transfer ownership to the EPA when the project proponent completes the CAIT.

Best practice would be for the project proponent to outline their plan for obtaining carbon rights, which should include the signing of legal contracts communicated in languages and methods that the participants understand [72].

3.6 Recognition of communities' land and resource rights

The project activities will likely not affect the land or resource rights of local communities or participants, thus the risk that this safeguard will not be effectively implemented is **low**. The project proponent has noted in project documents that research and trials of the AWD methods in Ghana and elsewhere have concluded that the method does not decrease yields nor reduce food security. In fact, the project proponent states that the AWD techniques are expected to increase rice yield. In addition, these methods are not expected to negatively impact the water availability of the region as the potential farmer participants are already managing water levels to the extent that the minimum water levels would still be sufficient for the traditional continuous flooding method [70]. The project proponent is also likely to further investigate any potential impacts of the project on land and resource usage and rights through several questions in the CAIT, including questions 5, 17, 23, 38, 39, and 56[69].

3.7 Provision to respect labour rights and working conditions

The risk that this safeguard is not effectively implemented is **low**, primarily due to the clear and detailed training plans for the farmers on implementing the project activities. Although the farmers are not employed by the project, they are implementing the project activities. Thus, this safeguard is relevant in regard to their safety in implementing project activities.

Technical training will be core to the project's implementation. The Ministry of Food and Agriculture (MOFA) will facilitate the adoption and trainings with the rice associations and CSIR-Crops Research Institute (CSIR-CRI) for the farmers [70]. The trainings will use the pre-existing manuals/guidance used by CSIR-CRI for the trials in Kumasi and include training on the use of the web app to access carbon incentives. Firstly, the project proponents plan to train the trainers. The training of the farmers will

then begin on 31 October and will be implemented in each irrigation scheme target region with up to 50 participants [70]. The clear training plans will likely support the safe implementation of the project activities. In addition, the related CAIT questions that the project proponent will complete, including 35, 36, and 37, will further encourage the project proponent to establish health and safety provisions [69].

3.8 Formal feedback and grievance/redress mechanism

The risk that an effective feedback/grievance mechanism is not in place is **moderate** as the project proponent has not outlined a formal grievance and redress procedure. The project proponent states that project stakeholders will have the opportunity to express their concerns to the implementing partners and be invited to review the project documentation before submission. The stakeholders will also have the opportunity to submit complaints to the host and buying countries confidentially [70]. The focal points that would address the raised concerns include from Ghana the Chief Director, Ministry of Environment, Science Technology and Innovation and from the Swiss Government, Eduard Medilanski, Policy Advisor, Compensation Office, Federal Office of the Environment Switzerland. However, the means by which a project participant or a local community member impacted by the project submits grievances is unclear and the procedures for addressing the grievances are undefined.

Best practice would be to define an accessible and traceable grievance procedure in the project documents and share the procedure with project stakeholders and potentially impacted communities during the stakeholder engagement process. The procedure should include details on how grievances will be resolved beyond who the focal point is, the steps that will be taken as the grievance is processed, timelines for addressing grievances, and what parameters would permit a grievance to not be resolved [73].

3.9 Measurement, reporting, and verification (MRV) provisions regarding rights and safeguards

The project proponent also did not disclose how data points on rights and safeguards will be monitored over time[70] aside from fertiliser use, thus the risk that relevant MRV provisions will not be effectively implemented is **high**. Best practice would be to outline MRV procedures for rights and safeguards in the PDD, which should include monitoring safeguards implementation and the state of their effectiveness throughout each monitoring period or more frequently if deemed appropriate.

3.10 Proportion of project revenues shared with local communities

The project proponent plans to offer yield index insurance cover and incentive payments for emissions avoided for participant farmers [70]. According to project documents, 47% of revenue from carbon finance will be distributed to farmers through direct financial incentives, training, monitoring support, and consultations. However, details on the how the incentive payments are distributed are not clear. Thus, there is a **moderate** risk that the benefits-sharing safeguard is not effectively implemented. The project proponent does acknowledge that the project will not generate revenue for participants and requires a 'drastic' change, shifting from an established cultural practice to AWD protocols, requiring financial incentives to make the switch. The project proponent plans to make payments in relation to the size of the farm to participants seasonally and after third-party verification.

Best practice regarding benefits sharing is to outline the payment stipulations, amount, timeframe, and conditions in the project design documents and with the participants during the community engagement and FPIC processes. It is currently unclear how the exact proportion of revenues shared with participants will be determined.

3.11 Mechanism or provision to ensure gender equity

The risk that this safeguard is not effectively implemented is **moderate** due to the lack of provisions to prevent gender-based discrimination and the minimal requirements to support female community members benefiting from the project activities. The project proponent has committed to training at least 30 female farmers of the total 100 targeted. The project proponent plans to track the number of female farmers trained by collecting their names and email addresses at each training event.

The appropriateness of this target is unclear as the project proponent did not identify the number of female farmers in the project area during the community engagement process [70]. However, approximately 50% of rural Ghanaian women are employed as farmers but with less access to agricultural resources as men [74]. Similarly, women make up half the country's crop producers but often lack land ownership and access to finance [75].

Specific protocols to be incorporated into the project design are not outlined in project documents. However, when the project proponent completes the gender equity-related CAIT questions (4, 6, 11, 12, 13, 14, 57, 58, 59, 60, 61, and 61), they will be prompted to think further about the gender equity provisions that the project requires [69].

Best practice would be for the project to identify the number of women who are farmers in the community and potential beneficiaries who are at risk of being excluded from project benefits during the community engagement process. Following the results of the community engagement process, the project proponent should identify the target number of female participants to match the proportion of female farmers and/or aspiring farmers in the project area, at the minimum; this would mitigate discrimination against female participants. For example, if the number of female farmers in the project area is 70 out of 100, then at minimum 70% of the farmer participants should be female farmers. In addition, projects should include provisions to prevent the discrimination of women benefiting from project activities including policies that encourage female participation depending on the project context, such as training sessions for all women farmers led by female trainers [76]. Furthermore, the project proponent's gender-based discrimination and sexual misconduct policies should be disclosed in project documents.

Environmental safeguards

The changes in agriculture practices required by the project design may impact the environment, although these impacts are likely to be minimal. The project activities do not require participant farmers to change the species planted. Thus, environmental safeguards related to planting activities (3/4) are not relevant to this project. The environmental safeguard that is relevant to this project is '12. Provision to address pollutants and environmental contaminants'. The project will also likely consider the potential negative environmental impacts it may have when completing CAIT questions 5, 16, 18, 19, 21, 22, 25, and 31 [69].

3.12 Provision to address pollutants and environmental contaminants

The risk that this safeguard is not effectively implemented is **low** due to the clear provisions the project has made on reducing and mitigating pollution caused by the project activities. Firstly, the AWD practices will require less agro-chemicals as plants will be able to develop deep and proliferous root systems and produce a high number of tillers and panicles, requiring less agro-chemicals to support their sustainment. Secondly, farmers will receive support throughout the project on how to appropriately use fertilisers. They will be required to make a statement on the web app that they have followed fertilisation recommendations outlined by MOFA and CSIR-CRI. The training for farmers includes how to appropriately use fertilisers. Further, the project proponent plans to support

appropriate use throughout the implementation and the web app will track fertiliser use amongst other characteristics of the project's implementation [70].

Best practice would be to also include a baseline of pollution caused by traditional rice farming methods in the area and a plan to measure the pollution impacts of the AWD methods. These measures should then be reported during each monitoring period and compared to the pollution levels caused by the traditional methods. The project proponent should have mitigation measures in mind to reduce pollution levels, should they increase.

3.13 Use of multiple species for planting activities

The species planted will not be affected by the project activities, thus this safeguard is **not relevant** for this project. However, the project does plan to offer optional training to farmers on agricultural diversification [70].

3.14 Exclusion of genetically modified organisms (GMOs)

This safeguard is also **not relevant** for this project because the species planted are not affected by the project activities. Nevertheless, the CAIT includes questions (20 and 25) on the use of GMOs, which will likely encourage the project proponent to consider any negative impacts of GMOs if farmer participants are using such species as part of their planting activities [69].

3.15 Use of native species

Similarly, this safeguard is **not relevant** as the project will not require farmers to change the species that they were previously growing. Notably, the CAIT does include question 19 on activities that could pose a risk to endangered species. Thus, the project proponent will likely investigate if any species that were previously used by farmers could pose a risk to endangered species [69].

Positive impact likelihood

Summary analysis

BeZero's assessment of this project's positive sustainable development impacts via the UN Sustainable Development Goals (SDGs) suggests that the likelihood the project will have high-integrity SDG contributions is **low to moderate**. Integrity refers to the positive uplift directly attributable to the project activities.

BeZero's definitions of high, moderate, and low likelihood of high-integrity SDG contributions are:

- High: Significant evidence that the project has high-integrity SDG contributions.
- Moderate: Some evidence that the project has high-integrity SDG contributions.
- Low: Minimal, no, or opposing evidence that the project has high-integrity SDG contributions.

BeZero analysts used the information provided in the project documents and by the project proponent through Switzerland's Federal Office for the Environment (FOEN) focal point to assess the likelihood that the project has high-integrity SDG impacts. The assessment assumes that the project proponent follows through on the SDG-related design elements included in the PDs. Analysts assessed the SDGs that the project explicitly aims to impact according to the PDs.

BeZero's assessment concludes that there is a low likelihood that the project will have high-integrity SDG contributions for the majority of the SDGs claimed (6/9), excluding SDG 13. Note that SDG 13 was excluded from the analysis as the project's SDG 13 claim is linked to carbon efficacy, thus insight into the integrity of this claim is provided in the carbon rating. The other three SDGs are assigned a moderate likelihood; all three of the moderate SDGs are social SDGs.

The project plans to complete the Climate Action Impact Tool (CAIT), which contains questions relevant to the SDGs claimed [69,70]. The tool's questions are not explicitly linked to particular SDGs and do not require baseline or monitoring data. Thus, data points added to the tool may increase data availability on the project's sustainable development impacts, but future completion of the tool would not be sufficient to demonstrate the robustness and extent of the related impacts.

All SDGs claimed by the project are lacking data transparency and specific durability measures. These two core areas negatively affect the likelihood scores for the three factors that each SDG is assessed against: robustness, quality, and durability. Data transparency would support the project's alignment with the transparency terms in the bilateral agreement between Ghana and Switzerland.

Best practice would be to identify multiple metrics to measure the impacts for each SDG claimed [77], provide data on the state of progress before the project is implemented (baseline data) [78], and include collecting monitoring data on these metrics in the project design [78]. Similarly, there should be demographic data disclosure on the populations that may be affected by the project activities, direct and indirect participants, and the project boundary. Such inclusions in the project design would likely increase the robustness and impact reach of the project's sustainable development contributions. In addition, including plans in the project design for supporting the continuation of positive impacts would likely support the durability of the project's sustainable development contributions.

Analysis of the integrity of each of the project's SDG claims is detailed in the sections below, with specific recommendations for each.

Table 4. Summary of SDG contributions analysis.

SDG claim	Likelihood level	Key outstanding risks
SDG 1 No Poverty	Moderate	Lack of impact metric, baseline data, and monitoring plan
SDG 2 Zero Hunger	Low	Lack of impact metric, baseline data, and monitoring plan
SDG 4 Quality Education	Moderate	Lack of baseline data
SDG 5 Gender Equality	Moderate	Lack of baseline data, likely non-additional SDG 5 objective
SDG 6 Clean Water and Sanitation	Moderate	Lack of baseline data and protocols to maintain impacts
SDG 8 Decent Work and Economic Growth	Low	Lack of impact metric, baseline data, and monitoring plan
SDG 9 Industry Innovation and Infrastructure	Low	Lack of impact metric, baseline data, monitoring plan, and potential durability of impacts
SDG 13 Climate Action	N/A	N/A
SDG 15 Life on Land	Moderate	Lack of impact metric, baseline data, and monitoring plan
SDG 17 Partnerships for the Goals	Moderate	Lack of impact metric, baseline data, and monitoring plan

Social SDG claims

The project claims five social-related SDGs, the majority of which (4/5) the project has a **moderate** likelihood of making high-integrity SDG impacts (see Table 5). The project has a low likelihood for the remaining social SDG claim (SDG 2).

SDG 4, 5, and 6 all have moderate robustness scores. The project design includes metrics for measuring the SDG impacts for these SDGs, but does not include methods for measuring baseline data on the metrics with which to compare the project's future impacts. Thus, all three received moderate robustness scores. The project does not define impact metrics for SDG 1 and 2, resulting in low data robustness.

As the project has not measured and does not include plans to measure the state of the project area related to the metrics that they are measuring these SDGs for, all social SDGs received low impact likelihood scores, except for SDG 6 and 2. SDG 6 and 2 both have higher potential for additional impacts due to the country's lack of progress towards the achievement of the related SDG objectives. Ghana has made relatively moderate progress towards SDG 1, 4, and 5, resulting in low impact scores.

All the social SDGs are assigned moderate durability scores, as related indirect benefits may continue beyond the project's crediting period. For instance, the project participants may continue to utilise the knowledge they gained from training even after the crediting period ends. However, as these benefits are indirectly linked to the project activities and there are no clear and robust plans in place to continue such impacts beyond the crediting period, the likelihood that the impacts will be durable is moderate rather than high.

Table 5. Summary of social SDG contributions analysis.

SDG claim	Project objective	Impact metric	Likelihood level
SDG 1 No Poverty	Create stable income for project participants through sustainable rice production	None provided	Moderate
SDG 2 Zero Hunger	Implement climate smart rice cultivation and irrigation methods	None provided	Moderate
SDG 4 Quality Education	Provide education and training on AWD and SRI to farmers of all ages	Number of farmers trained	Moderate
SDG 5 Gender Equality	Encourage female participation in the project activities	Number of female farmers trained	Moderate
SDG 6 Clean Water and Sanitation	Encourage sustainable water management practices	Area (hectares) where AWD is applied	Moderate

SDG 1 No Poverty

The project aims to contribute to SDG 1 by creating stable income for project participants through sustainable rice production [70]. The likelihood that this project will have high-integrity SDG 1 impacts is **moderate,** primarily due to the lack of baseline data and the absence of a plan to monitor the impacts over time.

Table 6. SDG 1 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Moderate
Durability	Moderate

Robustness

The likelihood that project data robustness will support high-integrity SDG 1 claims is **low**. The project provides no information as to how SDG 1 contributions will be measured. The PDD states that the project proponent will only monitor and quantify three of the SDGs throughout the crediting period: SDG 4, 5, and 10 [70]. Thus, the project has not included appropriate metrics in the project design for demonstrating SDG 1 contributions. However, the project does plan to complete the CAIT, which includes one question on negative/discriminatory project impacts on those living in poverty, including question 4 and several relevant optional questions [69].

Table 7. SDG 1 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Not included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Not included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Best practice would be to identify several metrics to monitor the project's SDG 1 contributions, such as an adaptation of the SDG indicator 1.1.1 metric 'Proportion of the population living below the national poverty line by sex, age, and employment status' [79]. The project should also collect data on the metric before the project activities begin to establish a baseline for the metric. This baseline could be used to determine the significance of the project's impacts on SDG 1 over time.

Impact

The likelihood that the project's SDG 1 impacts will be high integrity is **moderate** due to a lack of project-specific baseline data availability, although significant potential impacts are indicated by Ghana's stagnating SDG 1 progress. No baseline data was provided by the project, thus additionality analysis is primarily informed by the SDG 1 progress in Ghana. According to the SDG Index, major challenges remain and progress is stagnating towards Ghana's achievement of SDG 1. In 2023, 20.09% of the population was living under the poverty threshold of USD 2.15 a day, similar to the proportion since 2020 (see Figure 4) [80]. In addition, in 2023, 32.76% of the population was estimated to be living under the poverty threshold of USD 3.65 a day. This proportion has remained stable since 2020 (see Figure 4)[80].

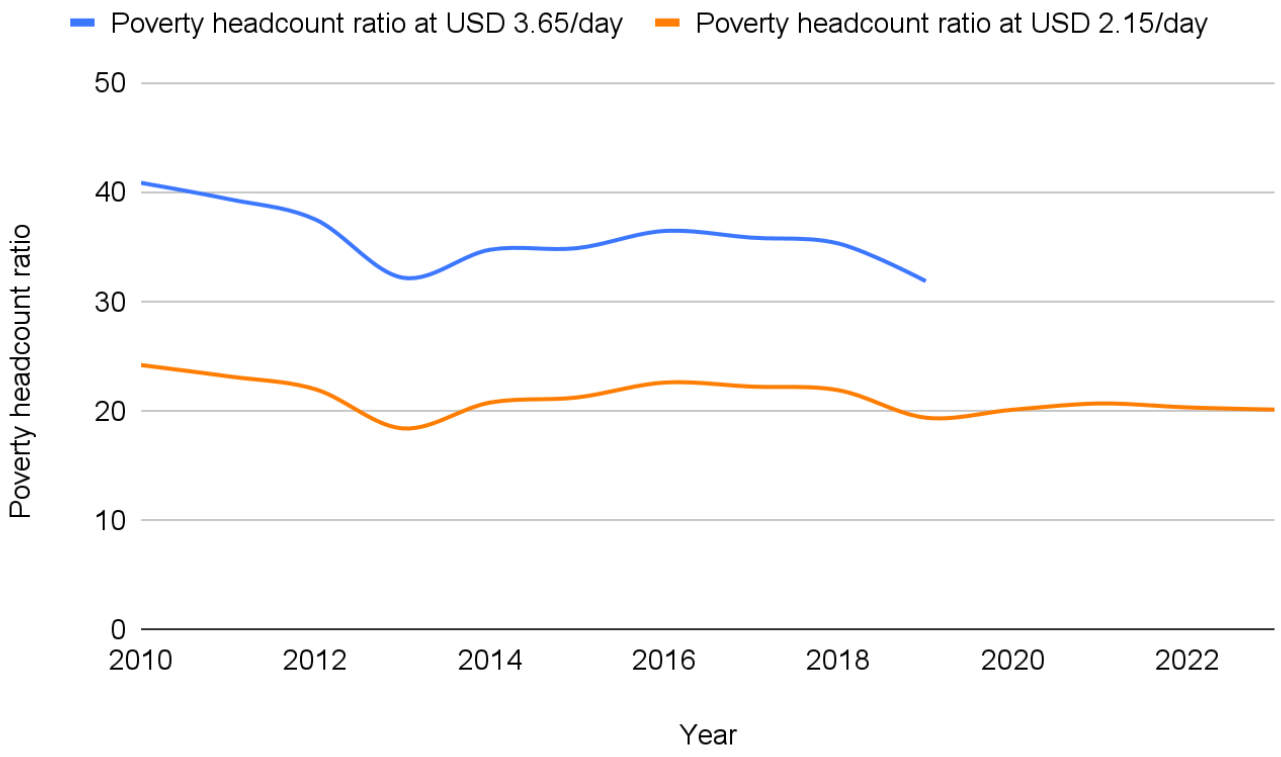

Figure 4. Two SDG 1 progress indicators on poverty thresholds sourced from the SDG Index tracking, poverty headcount ratio at USD 3.65/day and poverty headcount ratio USD 2.15/day[80]. Note, data is available for the USD 3.65/day ratio only for 2010-2019.

As progress towards SDG 1 in Ghana is stagnating and is facing significant challenges, project activities that aim to address SDG 1 have the potential to be highly additional. However, the project has not provided baseline data regarding poverty in the region prior to the project's implementation. Thus, it is not feasible to determine the additionality of the project's SDG 1 contributions to the project area.

Durability

The likelihood that the durability of the project's SDG 1 claim will support a high-integrity SDG 1 claim is **moderate**. The project has not defined plans to monitor nor sustain any of the project's specific SDG 1 contributions. However, the AWD practices will likely continue beyond the project's crediting period, thus, there is the potential the project will have durable SDG 1 impacts. Nevertheless, best practice would be to detail a plan for maintaining SDG 1 impacts in the PDD, such as how the insurance scheme will be maintained over time to ensure that the farmers will continue to have coverage and a stable income.

SDG 2 Zero Hunger

The project aims to contribute to SDG 2 through the implementation of climate smart rice cultivation and irrigation methods [70]. The likelihood that this project will have high-integrity SDG 2 impacts is **moderate,** primarily due to the lack of baseline data and no plan to monitor the impacts over time.

Table 8. SDG 2 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Moderate
Durability	Moderate

Robustness

The likelihood that the project data robustness will support high-integrity SDG 2 claims is **low**. The project did not identify any SDG data points that will be monitored.

Table 9. SDG 2 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Not included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Not included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Best practice would be to identify several metrics to use to monitor the project's SDG 2 contributions, such as an adaptation of the SDG 2.1.1 and 2.2.2 metrics 'Prevalence of undernourishment' and 'Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) [79]. The project should also collect data on the metric before the project activities begin to establish a baseline for the metric. This baseline could be used to determine the significance of the project's impacts on SDG 2 over time.

Impact

The likelihood that the project's SDG 2 impacts will be high integrity is **moderate** due to a lack of project-specific baseline data availability and the moderate progress that Ghana has made towards achieving SDG 2. No baseline data was provided by the project, thus additionality analysis is primarily informed by the SDG 2 progress in Ghana. According to the SDG Index, significant challenges remain to Ghana's SDG 2 achievement, although progress is moderately improving.

Indicators of progress that are most relevant to the project's SDG 2 aims indicate that Ghana is on track to achieve SDG 2 [80]. The prevalence of undernourishment is decreasing; in 2020, 4.10% of the population's food intake was insufficient to meet dietary energy requirements for a minimum of one year, a decrease of approximately 12% since 2001 [80]. Similarly, the country's cereal yield is also on track for SDG achievement; in 2021, 2.42 tonnes of cereals were harvested per hectare of harvested

land compared to 1.31 tonnes in 2000, a 54% increase [80]. However, according to the FAO, local production of rice specifically meets only 40% of the national demand [81].

Thus, although the SDG 2 progress indicators that are most related to the project's potential SDG 2 contributions are on track, rice production in general is not currently meeting national demand. Thus, the potential additionality of the project's SDG 2 contributions is moderate.

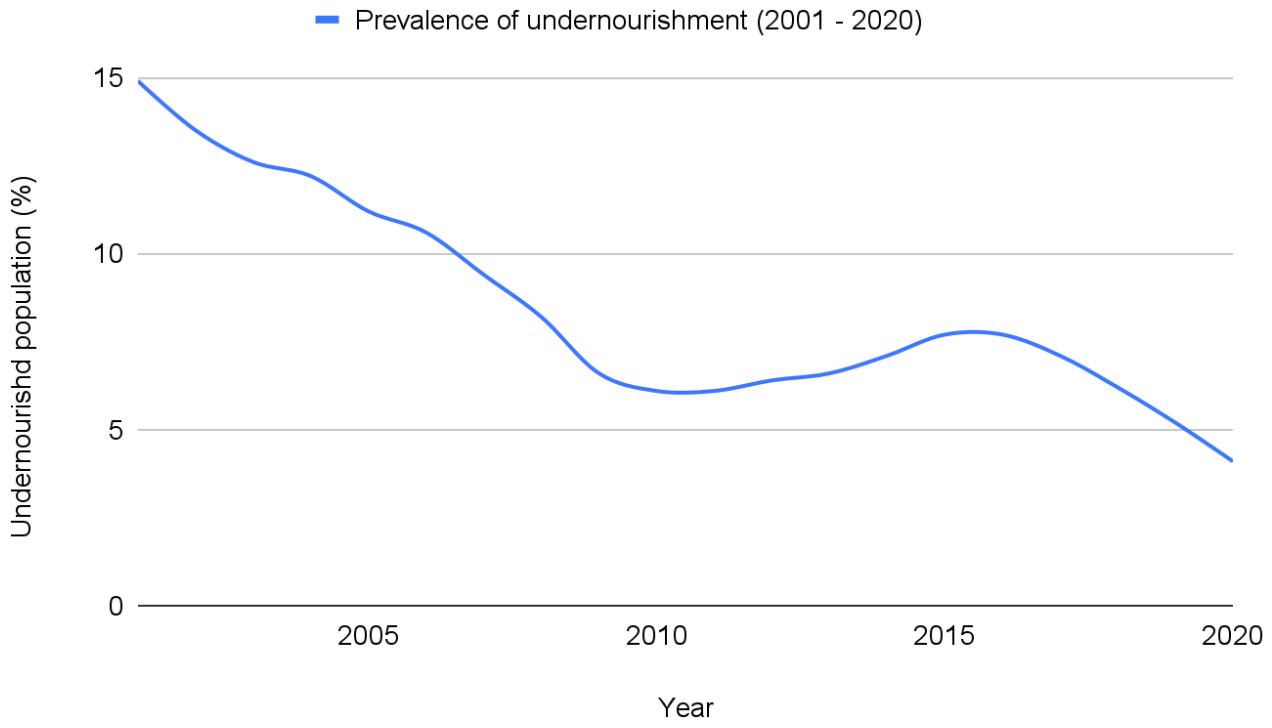

Figure 5. SDG 2 progress indicator sourced from the SDG Index tracking the prevalence of undernourishment.

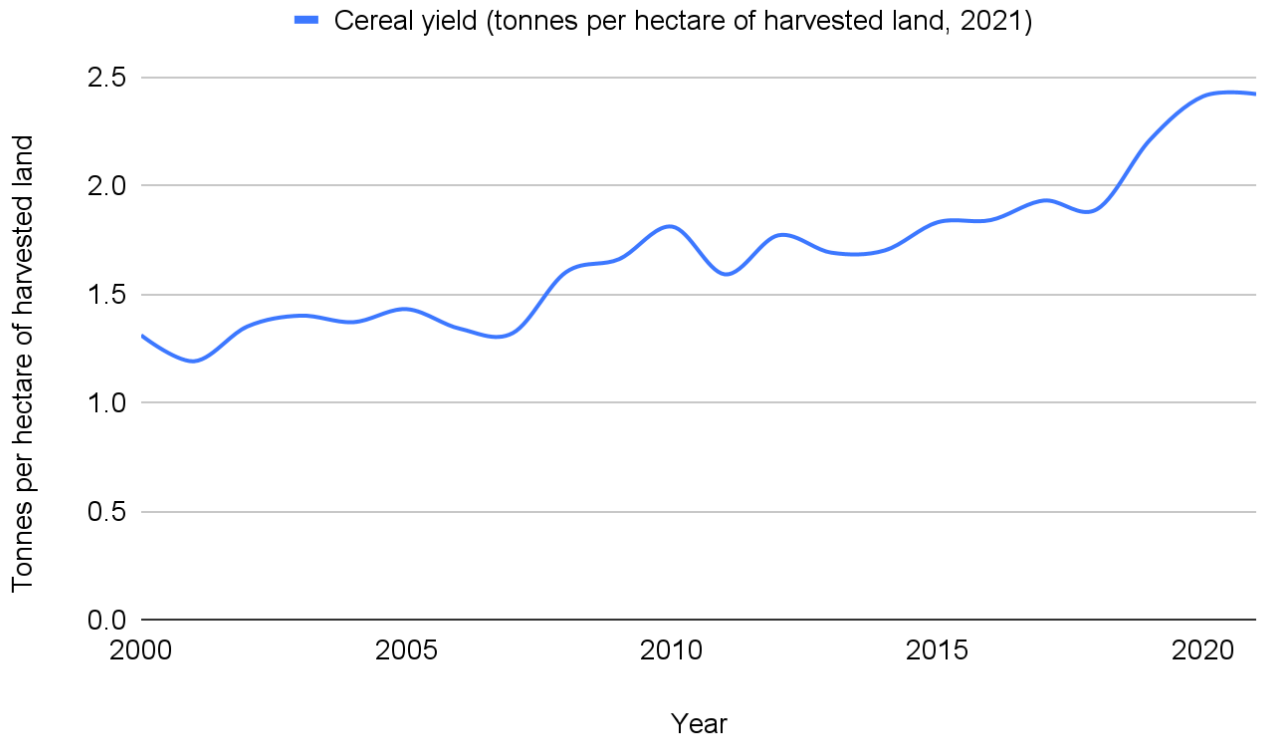

Figure 6. SDG 2 progress indicator sourced from the SDG Index tracking cereal yield by tonnes per hectare of harvested land [80].

Durability

The likelihood that the durability of the project's SDG 2 claim will support a high-integrity SDG 2 claim is **moderate**. The project has not defined plans to monitor nor sustain any of the project's specific SDG 2 contributions. However, the project aims to impact rice production practice in the long term, beyond the project's crediting period of eight years and six weeks [70]. Thus, there is the potential that the project will have durable SDG 2 impacts. Nevertheless, best practice would be to detail a plan for maintaining SDG 2 impacts in the PDD, such as how yields of the farms included in the project activities will be sustained.

SDG 4 Quality Education

The project plans to contribute to SDG 4 by providing education and training on AWD and SRI to farmers of all ages [70]. The likelihood that this project will have high-integrity SDG 4 impacts is **moderate**, primarily due to moderate robustness and durability likelihoods, despite the low impact likelihood.

Table 10. SDG 4 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Moderate
Impact	Low
Durability	Moderate

Robustness

The likelihood that the project data robustness will support high-integrity SDG 4 claims is **moderate**. The project plans to monitor SDG 4 over time by tracking the number of farmers trained [70]. The project proponent aims to train at least 100 farmers and will note their names and email addresses at each training event [70]. This chosen metric will likely provide an insight into participation in the project activity. However, the metric will not provide any insight into how many farmers were trained before the project activities took place. Best practice would be to define a metric that can provide an insight into the additionality of the project's impacts, such as tracking the number of people already trained in AWD practices.

In addition, the project plans to complete the CAIT, which includes some relevant questions for SDG 4. The CAIT has optional questions on the promotion of education, including 180-184, 211-213, and 218-220[69].

Table 11. SDG 4 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Quantitative data included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Impact

The likelihood the project's SDG 4 impacts will be high-integrity is **low** due to a lack of project-specific baseline data availability and the moderate progress that Ghana has made towards achieving SDG 4. No baseline data was provided by the project, thus our additionality analysis is primarily informed by the SDG 4 progress in Ghana and the current use of AWD practices. According to the SDG Index, challenges remain as to Ghana's SDG 4 achievement and whilst score progress is moderately improving, it is not on track for achievement by 2030 [80].

Education and awareness of AWD practices in Ghana and the project area is likely to be low as such practices are marginally used throughout the country [81]. However, exact statistics on how widespread AWD practices are and the knowledge of such practices are not available. Nevertheless, the low use of AWD practices indicates that there is some potential for the project to have additional SDG 4 impacts regarding AWD education.

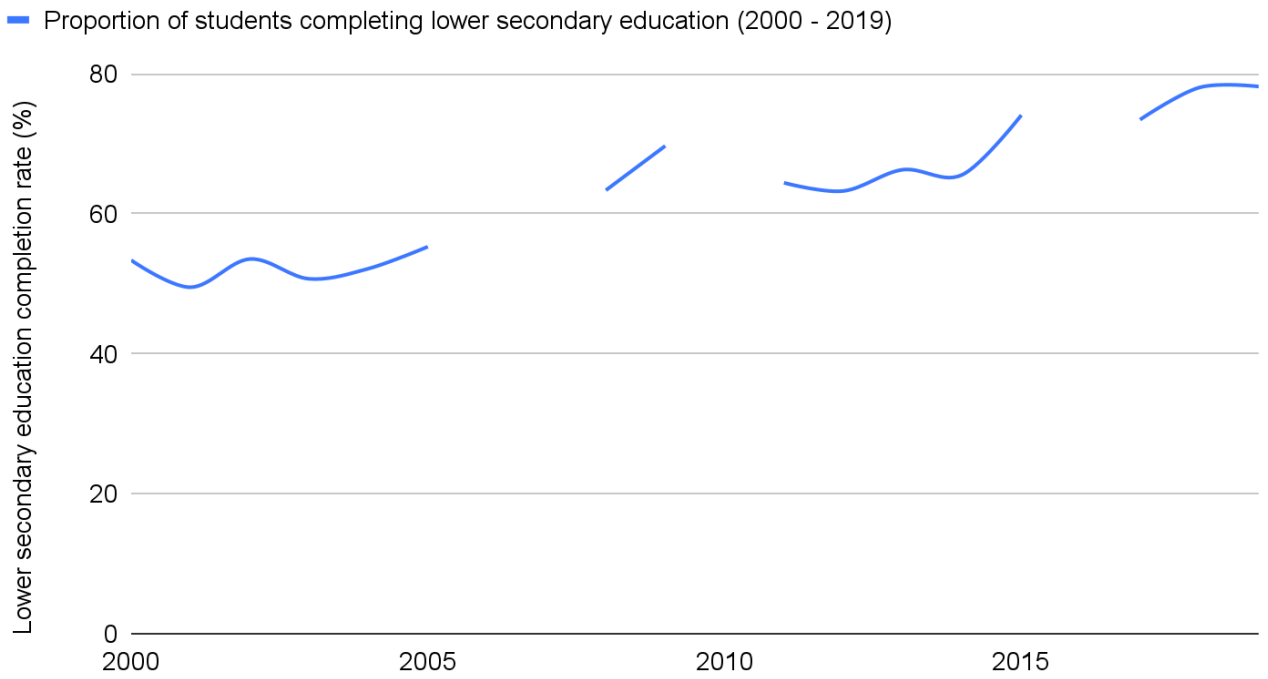

Figure 7. SDG 4 progress indicator sourced from the SDG Index tracking lower secondary school completion rate. The data gaps may arise from reliance on census data, limited data systems or lack of reported data.

Durability

The project's direct SDG 4 contributions are unlikely to continue beyond the crediting period but indirect contributions may, thus the likelihood that the project's SDG 4 contributions will be durable is **moderate**. Training is part of the project's implementation and will not continue beyond the project's crediting period. Therefore, the project's SDG 4 contributions to AWD education will not continue beyond this period. However, the knowledge that the project participants gained in the training on AWD practices is likely to be long lasting.

SDG 5 Gender Equality

The project plans to support SDG 5 by encouraging female participation in the project activities. Nevertheless, the likelihood that this project will have high-integrity SDG 5 impacts is **moderate** due to a lack of baseline data [70].

Table 12. SDG 5 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Moderate
Impact	Low
Durability	Moderate

Robustness

The likelihood that the project data robustness will support high-integrity SDG 5 claims is **moderate**. The project plans to monitor SDG 5 over time by tracking the number of female farmers trained in AWD practices [70]. The project proponent aims to train at least 30 female farmers out of the 100 total farmers [70]. The project proponent will note their names and email addresses at each training event. This chosen metric will likely provide an insight into female participation in the project activity. However, the metric will not provide any insight into how impactful the training is in empowering female farmers. It is unknown how many farmers in the project area are female and thus, it is unclear what an equitable but also impactful aim would be regarding the proportion of trained female farmers. As discussed in the gender equity safeguard section of this report, half of all farmers in Ghana are female, meaning that the project's aim of training 30 farmers may not be appropriate.

Best practice would be to define a metric that can provide an insight into the additionality of the project's impacts, such as tracking the number of women that are already trained in AWD practices and noting the number of female farmers in the project area during the stakeholder consultation.

In addition, the project plans to complete the CAIT, which includes some relevant questions for SDG 5. The CAIT has optional questions on gender-based discrimination, including questions 11-13, 282, and a question on supporting gender equality (question 57) [69].

Table 13. SDG 5 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Quantitative data included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Impact

The likelihood that the project's SDG 5 impacts will be high-integrity is **low** due to a lack of project-specific baseline data availability, although in general Ghana faces major challenges to achieving SDG 5. No baseline data was provided by the project, thus our additionality analysis is primarily informed by SDG 5 progress in the country as a whole. According to the SDG Index, major challenges remain as to Ghana's SDG 5 achievement and although score progress is moderately improving, it is not on track for achievement by 2030 [80].

The indicators of progress that are most relevant to the project include 'ratio of female-to-male mean years of education received' and 'ratio of female-to-male labour force participation rate', which have progressed further than the overall goal [80]. As of 2021, 86.74% of females aged 25 and over have received the same years of education as men aged 25 and over. However, major challenges continue and although progress is improving, the country remains off track to achieve the goal by 2030. On the other hand, as of 2022, 90.13% of women aged 15 and older out of men aged 15 and older who are

economically active participate in the labour force [80]. Thus, this indicator has been achieved and this figure is predicted to be maintained over time.

Whilst overall progress towards SDG 5 is insufficient, progress towards the indicators most related to the project's SDG 5 objective contributions are on track/have been achieved. In addition, as half of all farmers are women and the project only aims for a third of participants to be female, even if the project reached its goal, it is unlikely it would have significantly additional impacts due to the gap between the proportion of female farmers in the country and the project's target proportion of participants. This factor, alongside the country's SDG 5 progress, indicates that the project's contributions may have low additional impacts on Ghana's overall achievement of SDG 5.

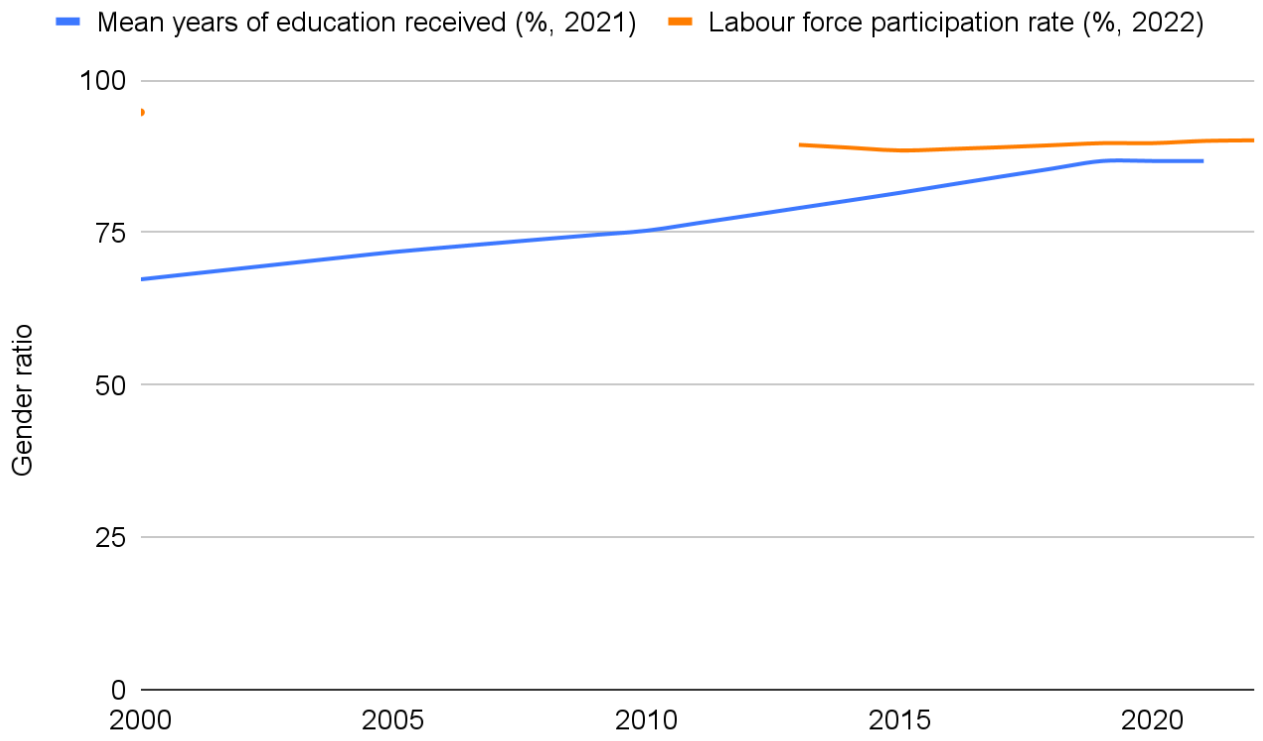

Figure 8. Two SDG 5 progress indicators sourced from the SDG Index tracking the ratio of female-to-male mean years of education received and the ratio of female-to-male labour force participation rate.

Durability

The project's direct SDG 5 contributions are unlikely to continue beyond the crediting period, but indirect contributions may, thus the likelihood that the project's SDG 5 contributions will be durable is **moderate**. Training is part of project implementation and will not continue beyond the project's crediting period. Therefore, the project's SDG 5 contributions by including female farmers in the project activities will continue if they are trained, but the education via training will not.

SDG 6 Clean Water and Sanitation

The project plans to support SDG 6 by encouraging sustainable water management practices [70]. The likelihood that this project will have high-integrity SDG 6 impacts is **moderate** as the project has identified relatively robust impact metrics, although the impacts of the project are unlikely to be additional or highly durable.

Table 14. SDG 6 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Moderate
Impact	Moderate
Durability	Moderate

Robustness

The likelihood that the project data robustness will support high-integrity SDG 6 claims is **moderate**. The project plans to monitor SDG 6 over time by tracking the area where sustainable water management is in place [70]. The project proponent aims for 14,000 hectares to be under sustainable water management [70]. The project proponent will track the area by having the participating farmers record the area in hectares, which will then be confirmed by the photos /and or videos on the web app [70].

This chosen metric will likely provide an insight into the hectares of land under sustainable water management as a result of the project. However, the metric will not provide any insight into how impactful the new water management practices will be overall as the total hectares of the project area that practised sustainable water management prior to the project's implementation is unknown. Best practice would be to note the number of hectares that practised sustainable water management before the project began.

Moreover, the project plans to complete the CAIT, which includes some relevant questions for SDG 6. The CAIT includes questions on safeguarding clean water and sanitation, including 23, 34, 56, and 100, as well as the optional question 152. Further optional questions on supporting improvements in water are included in questions 120, 122, 124, 171, 184, 186, 187, 190, 226, 237, 238, 240, 241, 300, 306, 315, 316, 317, 320,231, 325, 342, 360, and 361 [69].

Table 15. SDG 6 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Quantitative data included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Impact

The likelihood that the project's SDG 6 impacts will be high-integrity is **moderate** due to a lack of project-specific baseline data availability, although in general Ghana faces major challenges in achieving SDG 6. No baseline data was provided by the project, thus our additionality analysis is primarily informed by the SDG 6 progress in Ghana. According to the SDG Index, major challenges remain as to Ghana's SDG 6 achievement, and although score progress is moderately improving, it is not on track for achievement by 2030.

The indicator of progress that is most relevant to the project's aimed SDG 6 impacts, 'freshwater withdrawal', has achieved more progress than the overall goal. As of 2019, 6.32% of freshwater resources remain available for use after accounting for the total freshwater withdrawn by all major sectors and the total renewable freshwater resources [80]. Thus, this indicator has been achieved but data is unavailable as to how well the progress is being maintained. However, AWD practices are only marginally used throughout the country, thus sustainable water management as part of rice cultivation in particular is likely not widespread either [81]. Precise statistics on how widespread AWD practices are and sustainable water use are not available. Nevertheless, the low use of AWD practices indicates that there is some potential for the project to have additional SDG 6 impacts in relation to sustainable water use.

Whilst overall progress towards SDG 6 is insufficient, there has been progress towards the indicator that is most related to the project's SDG 6 objective. Thus, this project's contributions may have low additional impacts on Ghana's overall achievement of SDG 6.

Durability

The project's direct SDG 6 contributions are unlikely to continue beyond the crediting period but indirect contributions may, thus the likelihood that the project's SDG 6 contributions will be durable is **moderate**. The sustainable water use practices under the project activities may continue beyond the project's crediting period. However, protocols to continue the water practices beyond the crediting period have not been included in the project design. Thus, the durability of these impacts is not as high as it could be if specific protocols were in place, such as the organisation of continued planned meetings.

Economic SDG claims

The project claims three economic SDGs, however, it has a **low** likelihood of having high-integrity impacts in all three cases (see Table 16). The project did not identify metrics for measuring related impacts over the project's lifetime, nor included systems to sustain any related impacts beyond the crediting period. Metrics are necessary to accurately determine the integrity of the related SDG impacts. In addition, the impacts are unlikely to be sustained without a protocol or plan in place to support them.

However, SDG 9 and 17 received moderate impact scores. Project-specific baseline data is not available for either SDG, but the country faces significant challenges and its progress towards the achievement of SDG 9 and 17 has stagnated. Thus, the project has the potential to have significant impacts on the country's SDG 9 and 17 progress. Project-specific baseline data was also not available for SDG 8, but the country is making further progress towards the achievement of this SDG; therefore, there is less potential for the project to make additional impacts towards the country's achievement of SDG 8.

Table 16. Summary of SDG contributions analysis.

SDG claim	Project objective	Impact metric	Likelihood level
SDG 8 Decent Work and Economic Growth	Create new job opportunities for farmers, trainers, and other qualified personnel	None provided	Low
SDG 9 Industry Innovation and Infrastructure	Support access to smart agriculture methods via technology innovations	None provided	Low
SDG 17 Partnerships for the Goals	Increase technology 'know-how' to contribute to a more sustainable agriculture sector	None provided	Moderate

SDG 8 Decent Work and Economic Growth

The project plans to support SDG 8 by creating new job opportunities for farmers, trainers, and other qualified personnel [70]. The likelihood that this project will have high-integrity SDG 8 contributions is **low** due to a lack of baseline data and unclear employment objectives. The project proponent shared outside of the project documents that the project will not officially employ anyone, including farmers. We are awaiting clarification regarding trainers and other personnel.

Table 17. SDG 8 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Low
Durability	Low

Robustness

The likelihood that the project data robustness will support high-integrity SDG 8 claims is **low** as the project has not identified any metrics for measuring this SDG impact. Thus, the project has not included appropriate metrics in the project design for demonstrating SDG 8 contributions. However, the project does plan to complete the CAIT, which includes one optional question related to SDG 8 on promoting decent work and economic growth (question 156) [69].

Table 18. SDG 8 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Not included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Best practice would be to identify several metrics to monitor the project's SDG 8 contributions, such as an adaptation of SDG 8.3.1 'proportion of informal employment in total employment, by sector and sex' and 8.5.2 'unemployment rate, by sex, age, and persons with disabilities' [70]. The project should also collect data on the metric before the project activities begin to establish a baseline for the metric. This baseline could be used to determine the significance of the project's SDG 8 impacts over time.

Impact

The likelihood that the project's SDG 8 impacts are additional is **low** due to a lack of project-specific baseline data availability and the moderate progress that Ghana has made towards achieving SDG 8. No baseline data was provided by the project, thus our additionality analysis is primarily informed by the SDG 8 progress in Ghana. According to the SDG Index, significant challenges remain to Ghana's SDG 8 achievement; although progress is moderately improving, it is insufficient to meet the goal [82].

However, the indicator of progress that is most relevant to the project's aimed SDG 8 contributions, 'unemployment rate', has been achieved and is being successfully maintained [80]. Although overall progress towards SDG 8 in Ghana has not been achieved, the indicator that is most relevant to the project's SDG 8 objectives has. Thus, the potential additionality of the project's SDG 8 contributions is likely low.

Figure 9. SDG 8 progress indicator sourced from the SDG Index tracking unemployment rate [80].

Durability

The likelihood that the durability of the project's SDG 8 claim will support a high-integrity SDG 8 claim is **low**. The project has not defined plans to monitor nor sustain any of the project's specific SDG 8 contributions. Particularly due to the contradicting information regarding the project's employment objectives, it is unclear if and how the project could continue to have SDG 8 impacts beyond the project's crediting period of eight years and six weeks. Best practice would be to detail a plan for maintaining SDG 8 impacts in the PDD, such as a strategy for maintaining such impacts.

SDG 9 Industry Innovation and Infrastructure

The project plans to contribute to SDG 9 by supporting access to smart agriculture methods via technology innovations [70]. The likelihood that this project will have high-integrity SDG 9 impacts is **low**, primarily due to a lack of baseline data.

Table 19. SDG 9 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Moderate
Durability	Low

Robustness

The likelihood that the project data robustness will support high-integrity SDG 9 claims is **low** as the project has not identified any metrics for measuring this SDG impact, thus the project has not included appropriate metrics in the project design for demonstrating SDG 9 contributions. However, the project does plan to complete the CAIT, which includes optional questions related to SDG 9 on promoting innovation (74 and 128) [69].

Table 20. SDG 9 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Not included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Not included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Best practice would be to identify several metrics to monitor the project's SDG 9 contributions, such as an adaptation of SDG 9.b.1 'proportion of medium and high-tech industry value added in total value added' and SDG 9.c.1 'proportion of population covered by a mobile network, by technology' [79]. The project should also collect data on the metric before the project activities begin to establish a baseline for the metric. This baseline could be used to determine the significance of the project's SDG 9 impacts over time.

Impact

The likelihood that the project's SDG 9 impacts are additional is **moderate** due to a lack of project-specific baseline data availability and the moderate progress that Ghana has made towards achieving SDG 9. No baseline data was provided by the project, thus our additionality analysis is primarily informed by the SDG 9 progress in Ghana. According to the SDG Index, significant challenges remain to Ghana's SDG 9 achievement; although moderate progress is being made, it is insufficient to meet the goal [82].

There are major challenges to the achievement of the progress indicator that is most relevant to the project's aimed SDG 9 contributions: 'expenditure on research and development' [80]. In 2007, the proportion spent on research and development was 0.23% of Ghana's GDP, whereas in 2010 it was 0.38% [80]. The use of web-based technology for improved agriculture in Ghana is not new. The Ghana e-Agriculture project, which created a platform for connecting agriculture stakeholders across the whole value chain to support modernisation and productivity, was launched in 2015. However, the technology is not specific to rice production, thus the potential additionality of the project's SDG 9 contributions via the web app is likely to be moderate.

Durability

The likelihood that the durability of the project's SDG 9 claim will support a high-integrity SDG 9 claim is **low**. The project has not defined plans to monitor nor sustain any of its specific SDG 9

contributions. The web app is the primary medium for the project's SDG 9 impacts. Such contributions are therefore likely to end when the crediting period ends as the web app use is directly tied to the project's crediting, meaning its use will likely not continue beyond the project's crediting period.

SDG 17 Partnerships for the Goals

The project plans to support SDG 17 by increasing technology 'know-how' to contribute to a more sustainable agriculture sector [70]. The likelihood that this project will have high-integrity SDG 17 impacts is **moderate**, primarily due to a lack of baseline data.

Table 21. SDG 17 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Moderate
Durability	Moderate

Robustness

The likelihood that the project data robustness will support high-integrity SDG 17 claims is **low** as the project has not identified any metrics for measuring this SDG impact. Thus, the project has not included appropriate metrics in the project design for demonstrating SDG 17 contributions.

Table 22. SDG 17 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in the project design
SDG impact provided at the target scale	Not included in the project design
Identified impact metric	Not included in the project design
Impacts compared to a baseline	Not included in the project design
Ex post and ex ante assessment provided	Not included in the project design
Monitoring data provided	Not included in the project design
Validation/verification by a third party	Not included in the project design
Additionality considered	Not included in the project design

Best practice would be to identify several metrics to monitor the project's SDG 17 contributions, such as an adaptation of SDG 17.7.1 'total amount of funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies' [79]. The project should also collect data on the metric before the project activities begin to establish a baseline for the metric. This baseline could be used to determine the significance of the project's impacts on SDG 17 over time.

Impact

The likelihood that the project's SDG 17 impacts are additional is **moderate** due to a lack of project-specific baseline data availability and the moderate progress that Ghana has made towards achieving SDG 17. No baseline data was provided by the project, thus our additionality analysis is primarily informed by SDG 17 progress in Ghana. According to the SDG Index, significant challenges remain to Ghana's SDG 17 achievement and progress is stagnating [80].

There are significant challenges to the achievement of the progress indicator that is most relevant to the project's aimed SDG 17 contributions: 'Statistical Performance Index', which is the weighted average of the statistical performance indicators that evaluate the performance of national statistics systems [80]. As of 2022, 64.24% of the country's data use, data services, data products, data sources, and data infrastructure was adequate [80]. As mentioned in relation to SDG 9, web-based technology for improved agriculture in Ghana has been implemented across the country before. For example, the Ghana e-Agriculture project, launched in 2015, created a platform for connecting agriculture stakeholders across the whole value chain to support modernisation and productivity. Nevertheless, the impact of stagnating progress on overall SDG 17 progress and the significant challenges that remain to the achievement of the project's most relevant SDG 17 indicator suggests that the project's web app will likely still have moderate additional contributions to SDG 17.

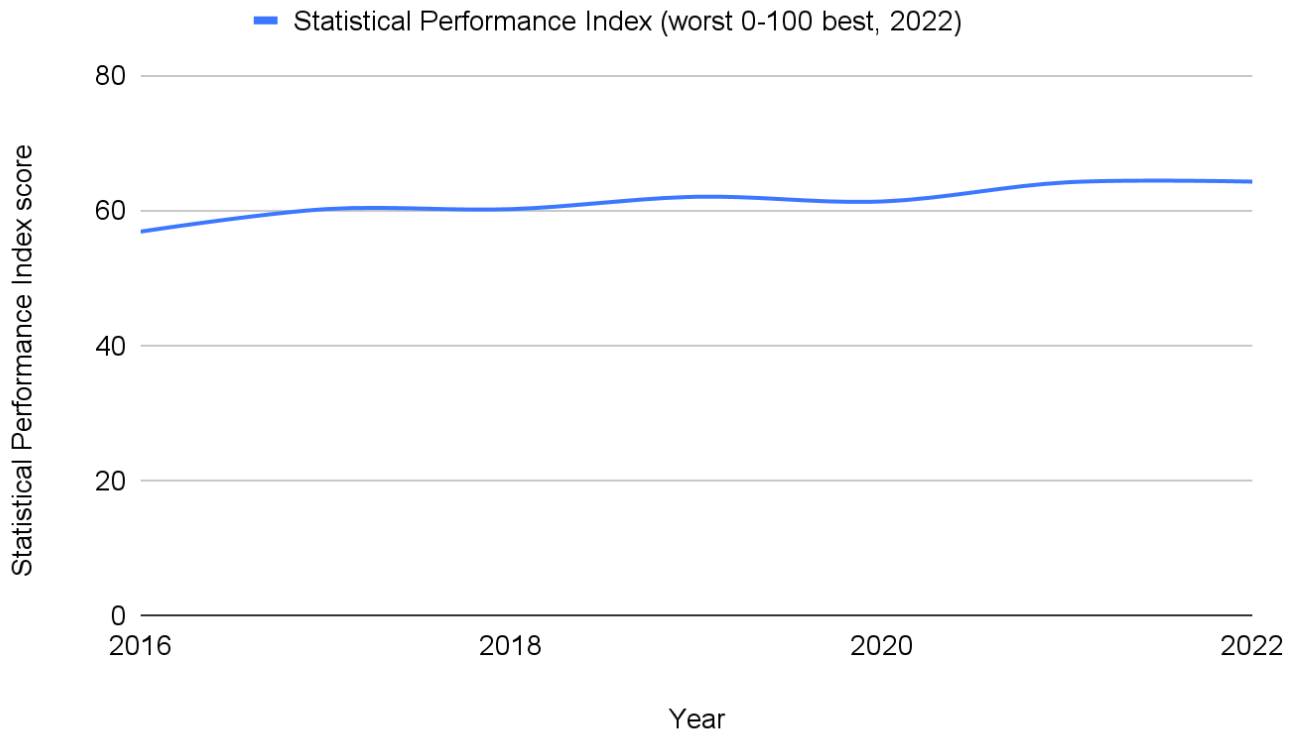

Figure 10. SDG 17 progress indicators sourced from the SDG Index tracking the Statistical Performance Index. The index is a weighted average of the statistical performance indicators that evaluate the performance of national statistics systems, data use, data services, data products, data sources, and data infrastructure.

Durability

The likelihood that the durability of the project's SDG 17 claim will support a high-integrity SDG 17 claim is **moderate**. The project has not defined plans to monitor nor sustain any of the project's specific SDG 17 contributions. In addition, as the web app is the main way in which the project plans to impact SDG 17, this contribution is likely to end when the crediting period ends. However, the technology 'know-how' that the project aims to support will likely continue to have an impact after the project's crediting period has ended as project participants who learned technology skills from using the app will likely be able to apply them if they use similar technology in the future. Nevertheless, this theoretical impact would be indirectly caused by the project activities. Thus, the project is not likely to have highly durable SDG 17 impacts.

Environmental SDG claims

The project claims two environmental SDGs: SDG 13 and SDG 15. However, the project's SDG 13 claim is purely related to greenhouse gas efficacy, thus the likelihood that the project will have high-integrity SDG 13 impacts is instead addressed in the project's carbon rating.

The likelihood that the project will have high-integrity SDG 15 impacts, however, is **moderate**. The project's robustness score for SDG 15 is low as the project has not identified metrics for measuring related impacts over the project's lifetime. Impacts must be measured in order to accurately analyse their integrity. The SDG 15 impact score is moderate. Project-specific baseline data is not available but the country faces significant challenges and progress towards the achievement of the relevant SDG 15 indicator has stagnated. Thus, the project has the potential to have a significant impact on the country's SDG 15 progress. The robustness score is also moderate as the project may have continuous impacts on soil quality if the farmers continue aerating the soil beyond the project's crediting period.

SDG 15 Life on Land

The project plans to support SDG 15 by improving soil quality through aeration, which is expected to increase zinc availability and improve plant root anchorage and lodging resistance[70]. Despite this intervention, the likelihood that the project will have high-integrity SDG 15 impacts is **moderate,** primarily due to a lack of baseline data.

Table 23. SDG 15 integrity factor summary.

Integrity factor	High-integrity contribution likelihood
Robustness	Low
Impact	Moderate
Durability	Moderate

Robustness

The likelihood that the robustness of the project data will support high-integrity SDG 15 claims is **moderate** . The project had not identified specific metrics for measuring its SDG impact. Thus, the project has not provided appropriate metrics in its design to demonstrate contributions to SDG 15.

Table 24. SDG 15 project data transparency summary table.

SDG data point	Transparency status
Quantitative and qualitative evidence provided	Not included in project design
SDG impact provided at target scale	Not included in project design
Identified impact metric	Not included in project design
Impacts compared to a baseline	Not included in project design
Ex post and ex ante assessment provided	Not included in project design
Monitoring data provided	Not included in project design
Validation/verification by a third party	Not included in project design
Additionality considered	Not included in project design

Best practice would be to identify several metrics to use to monitor the project's SDG 15 contributions, such as an adaptation of the SDG 15.3.1, 'Proportion of land that is degraded over total land area'[79]. Collecting baseline data on these metrics before the project activities begin would allow the project to determine the project's impacts on SDG 15 over time.

Impact

The likelihood that the project's SDG 15 impacts are additional is **moderate, primarily** due to the absence of project-specific baseline data. Current use of soil health-enhancing rice cultivation practices in Ghana informs the additionality analysis. Alternate Wetting and Drying (AWD) practices are minimally used across the country, suggesting that implementing these practices could significantly improve soil health on rice cultivation land. However, exact statistics on the prevalence and awareness of AWD practices are unavailable, increasing the information risk and resulting in a moderate likelihood of additional impacts. [81]

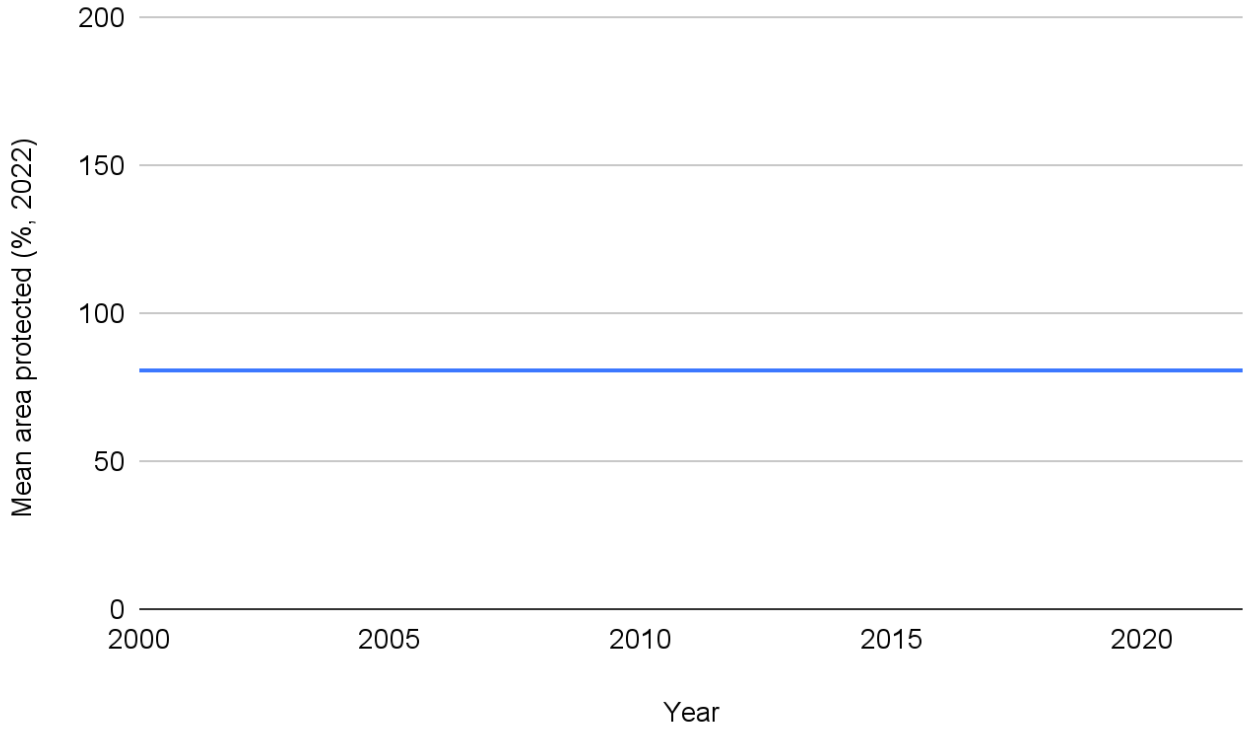

Figure 11. illustrates the SDG 17 progress indicators sourced from the SDG Index tracking, Statistical Performance Index. The y axis shows the mean area that is protected in freshwater sites that are important to biodiversity. The index is a weighted average of the statistical performance indicators that evaluate the performance of national statistics systems, data use, data services, data products, data sources, and data infrastructure.

Durability

The likelihood that the project's SDG 15 claim's durability will support a high-integrity SDG 15 claim is **moderate**. The project has not defined plans to monitor or sustain the project's specific contributions to SDG 15. While improvements to soil quality might persist if farmers continue AWD methods, the lack of protocols to ensure the sustainability of these practices reduces the likelihood of highly durable SDG 15 impacts.

Appendix A.

Safeguard definitions

1. Provision to prevent the displacement of people

Provisions to prevent the displacement of people safeguards against project activities that could lead to involuntary relocation or resettlement. While this typically refers to the physical displacement of people from their homes, it could also refer to economic displacement if project activities replace means of income for community members. Measures to prevent displacement typically involve acknowledgement by project developers that community members shall not be economically or physically displaced. At times, provisions only exist for property owners.

2. Translation of project documents to local languages

Translation of project documents to local languages involves communicating a project's potential impacts on local communities and project area via local languages fully understood by the people in and surrounding the project area. BeZero considers this safeguard to be fulfilled if the potential project impacts are publicly communicated to those who may be impacted by the project. This can include summaries of the relevant sections of project documents and stakeholder meetings with distributed meeting notes. Thus, translation may be needed in the local language(s) widely spoken by people living in the community rather than the national language of the country the project is located.

Translating relevant project documents helps ensure that community members are informed about projects occurring in or near their community and allows for effective communication between project developers and communities. Communication about project impacts is often included as part of standard bodies' free, prior, and informed consent (FPIC)[8] safeguard requirements.

3. Free, prior, and informed consent (FPIC)

The concept of free, prior, and informed consent (FPIC) originates from the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), which sets forth that any activity that affects indigenous people shall be done with the free, prior, and informed consent of those impacted[8, 22]. There are four main elements of FPIC that constitute its definition, according to the Food and Agriculture Organization (FAO) of the United Nations:

- **Free**: *"refers to a consent given voluntarily and without coercion, intimidation or manipulation. It also refers to a process that is self-directed by the community from whom consent is being sought, unencumbered by coercion, expectations or timelines that are externally imposed."*(p.15)[8]
- **Prior**: *"means that consent is sought sufficiently in advance of any authorization or commencement of activities, at the early stages of a development or investment plan, and not only when the need arises to obtain approval from the community."*(p.15)[8]
- **Informed**: *"refers mainly to the nature of the engagement and type of information that should be provided prior to seeking consent and also as part of the ongoing consent process."*(p.15)[8]
- **Consent**: *"refers to the collective decision made by the rights-holders and reached through the customary decision-making processes of the affected Indigenous Peoples or communities. Consent must be sought and granted or withheld according to the unique formal or informal political-administrative dynamic of each community. Indigenous peoples and local communities must be able to participate through their own freely chosen representatives, while ensuring the participation of youth, women, the elderly and persons with disabilities as much as possible."*(p.16)[8]

As defined by FAO, the IFC Performance Standards, and the ICVCM, FPIC is required when any project uses land, territory, and/or resources that are traditionally owned, occupied, or otherwise used by indigenous peoples and/or local communities for livelihoods or cultural purposes[6,8,9].

Because of the sensitive and distinct nature of FPIC, projects and standards bodies must explicitly state that they are following the FPIC process in order to be considered compliant with the FPIC requirement. Thus, indigenous peoples and local communities should be given the right to actively consent voluntarily, prior to the implementation of the project, and with sufficient information regarding any positive/negative impacts of the project.

4. Involvement of indigenous peoples

This safeguard involves including indigenous peoples in project design and consulting indigenous peoples throughout the course of the project. Involvement should be inclusive and comprehensive to ensure that the project is implemented in a way that is consistent with indigenous peoples' rights to self determination.

5. Explicit legal recognition of communities' rights to carbon

This safeguard involves project developers explicitly recognising that communities have the right to the carbon credits created by the project if their land, resources, or participation play a role in generating the credits. This recognition can be implemented via a contract signed by community members that waives their rights to carbon reductions and transfers them to the project developer.

6. Recognition of communities' land and resource rights

This safeguard recognises that local communities often have rights to the land and resources involved in the project, such as land, timber, and other resources. Thus, these rights must be maintained in the project design and implementation and/or the rights transferred to the project developer via a legal agreement.

7. Provision to respect labour rights and working conditions

Many projects employ local community members or others to work on the project. Thus, this safeguard protects the rights of workers to ensure that local, national, and international labour laws are being followed.

8. Formal feedback and grievance/redress mechanism

This safeguard involves a mechanism which allows for local community members and those impacted by the project to be able to file grievances about the project which are acknowledged by the project developer. This involves the community/other stakeholders understanding how to file grievances and having the ability to do so throughout the project lifetime.

9. MRV provisions regarding rights and safeguards

This safeguard requires that measurement, reporting, and verification (MRV) measures are followed for each safeguard implemented in the project. Any safeguard administered by the project, such as a grievance mechanism, should be subject to MRV provisions to ensure its ongoing efficacy.

10. Proportion of project revenues shared with local communities

This safeguard involves the establishment and follow-through of a mechanism to share project revenues with local communities. The sharing of project revenues can come in multiple forms including the distribution of revenues directly with community members and the establishment of communal pots for distribution by committees or to fund community projects.

11. Mechanism or provision to ensure gender equity

The gender equity safeguard is evidence that the project design has incorporated systems to ensure gender equity is supported by the project design and upheld throughout the project lifetime.

12. Provision to address pollutants and environmental contaminants

The safeguard requires a system in place which avoids the release of pollutants and environmental contaminants where possible. If pollutants and environmental contaminants are released, there is a provision in place to mitigate them and ensure that they will not have a negative effect on the project area.

13. Use of multiple species rather than monoculture for planting activities

For projects which involve planting activities, this safeguard involves utilising multiple species when plating. This safeguard may not be applicable to projects which plant only native species.

14. Exclusion of Genetically Modified Organisms (GMOs)

This safeguard is in place for projects which involve planting species, when GMOs are not used as part of the planting activities.

15. Use of native species

For projects which involve planting activities, this safeguard involves utilising species native to the project area.

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