

Requirements specification for the system and risk analysis

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GSS **C E**
R T

Voluntary Carbon Offsets System

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Introduction

This document defines the requirements that must be met by the GSS CERT System and the part of its implementation in GSS IT.

Basic requirements specification

1. The system calculates emissions in accordance with the adopted methodology
2. GHG offsets are calculated by the system based on the entered parameters as equivalent in tons of CO₂e
3. The system has a function to automatically test the correctness of the calculation for a set of test data
4. The emission calculated by the system is validated by an independent Verifier
5. The emission calculated by the system is associated with the approved version of the algorithm and has assigned detailed logs of its calculation
6. The algorithm used to calculate emissions is validated and versioned in the system after an external validation and verification procedure is performed
7. The algorithm used for calculation of a specific emission is associated with it and auditable
8. It is impossible to change the algorithm used to calculate emissions or the parameters associated with it
9. The calculation of emissions is done transparently by using a smart contract mechanism on the blockchain
10. All key system data related to emissions are stored on the blockchain
11. All key system operations are performed as smart contract transactions
12. It is impossible to manually swap the calculation of emissions, the parameters used to calculate emissions, existing avoided and absorbed emissions in the system, redeemed emissions
13. The system has an artificial intelligence mechanism that examines the characteristics of the batch data used to calculate GHG offsets and reports on the quality of the data
14. For each ton of CO₂ offset, detailed logs of its calculation can be viewed

Identified risks

Risk of using the wrong version of the system documentation

Risk position	Description	
Risk of using the wrong version of the system documentation	Methodology documentation is hand-picked by the person preparing the project documentation. System documents are updated frequently, and calculation methodologies are a particularly sensitive item. Incorrect selection of the documentation version, e.g. related to the use of an outdated version or a version incorrect in terms of territory, results in incorrect project preparation and incorrect calculation of avoided and absorbed GHG emissions.	
Primary risk: 9	Primary impact: high	Primary probability: high
Risk mitigation	For each country in which the system is used and for each year in which validations and verifications are performed, parameters are located within the system, which can be found in the GSS CERT IT system in blockchain. The system includes special procedures for their verification before placing them in the production system. One-time, specially supervised and externally verified process of placing them in GSS CERT IT makes possible use of a bad indicator impossible.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 1. Risk of using the wrong version of the system documentation

Risk of misinterpretation of system documentation

Risk position	Description	
Risk of misinterpretation of system documentation	Documentation of the methodology is interpreted each time in the context of the project. Due to the high complexity and complexity of the topic, there is a risk of misinterpreting the methodology and its requirements, especially in the context of calculating avoided and absorbed GHG emissions. The process is also sensitive to the quality of human teams. This means that even with the use of an external validator and verifier there may be differences related to the experience of particular people.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	Specific documentation and its version is selected as part of participation in the system. Apart from system documents, the main business processes and system logic are implemented in a dedicated IT system - GSS CERT IT. The risk of misinterpretation does not exist in this situation.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 2. Risk of misinterpretation of system documentation

Risk of choosing/entering wrong calculation parameters

Risk position	Description	
Risk of choosing/entering wrong calculation parameters	Models for calculating avoided and absorbed emissions are based on a large number of variables and parameters. There is a high chance of error in their determination, in particular if the indicator is based on multiple data sources or depends on e.g. the average temperature in a country. The risk of choosing the wrong indicator is high, and catching potential errors is a difficult task.	
Primary risk: 9	Primary impact: high	Primary probability: high
Risk mitigation	For each country in which the system is used and for each year in which validations and verifications are performed, parameters are located within the system, which can be found in the GSS CERT IT system in blockchain. The system includes special procedures for their verification before placing them in the production system. One-time, specially supervised and externally verified process of placing them in GSS CERT IT makes possible use of a bad indicator impossible.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 3. Risk of choosing/entering wrong calculation parameters

Risk of incorrectly compiling source data

Risk position	Description	
Risk of incorrectly compiling source data	The source data used for calculations must be accurately collected and standardized. Any error in this area results in an incorrect emission calculation in terms of incorrect data.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	The GSS CERT IT system requires data entry through validated and pre-verified data sets. These are stored as a transaction on the blockchain and feed the calculator's algorithms in a completely automatic way. The standardized way of entering data minimizes the risk of misinterpretation of the data entered into the calculation.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 4. Risk of incorrectly compiling source data

Risk of conversion error when rewriting formulas

Risk position	Description	
Risk of conversion error when rewriting formulas	Systems that describe methodologies for calculating avoided and reduced GHG emissions describe how to independently calculate expected results and values through the calculation method provided. Apart from the fact that some formulae are complex and embedded in the context of the selection of correct conversion factors, they need to be correctly transcribed and used. The risk of making a mistake when prescribing the formulae for the calculation is significant, and the result of a mistake results in incorrectly calculated avoided and absorbed emissions.	
Primary risk: 9	Primary impact: high	Primary probability: high
Risk mitigation	In the GSS CERT System, all patterns and algorithms based on them are embedded in the blockchain as part of the smart contract mechanisms. The algorithm code used for calculations is stored in a human readable and understandable form. Moreover, the algorithm code undergoes external validation and verification by an independent third party. The system also has built-in automatic tests that check whether the algorithm's result is consistent with the expected values.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 5. Risk of conversion error when rewriting formulas

Risk of entering incorrect/inadequate source data

Risk position	Description	
Risk of entering incorrect/inadequate source data	Using the methodologies for calculating avoided and absorbed GHG emissions involves, at the end, a conversion result based on the data entered. If the result is incorrect for any reason, it is difficult to know that the result may be incorrect. The person who makes the report may not have enough experience to assess the correctness of the results and calculations even in a general manner. The error can be related to a wide range of aspects such as errors in transcribing source data, errors in transcribing formulas etc. Regardless of its source, there is a difficulty in identifying the discrepancy of results with those expected.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	The GSS CERT IT system uses previously validated and verified algorithms. Data entered as part of the verification is appropriately codified and standardized, in a consistent manner for all installations participating in the system. GSS specialists using support offered by the IT system are able to catch discrepancies, if they occur. Also, the fact that the installation data is initially entered as part of the verification by GSS makes it possible to catch inaccuracies and correct them before the verification by an independent third party begins.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 6. Risk of entering incorrect/inadequate source data

Risk of incorrect conversion when calculating avoided and absorbed GHG emission

Risk position	Description	
Risk of incorrect conversion when calculating avoided and absorbed GHG emission	The offsets calculated under the methodology are defined as the equivalent of avoided or absorbed emissions expressed in CO ₂ equivalent, recorded as CO ₂ e. Most calculations are performed on gasses such as CH ₄ or N ₂ O, also in the form of different conversion factors, and then their respective conversion factors are used to get the value expressed as CO ₂ e. The person performing the calculation can make a mistake by entering the wrong version of the conversion factor or forgetting about the factor, which ultimately leads to calculation errors.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	In a dedicated computer system, the computational parameters, including conversion rates, are stored correctly on the blockchain. All parameters and calculation indicators that are used to calculate emissions must be verified by an independent verifier in accordance with applicable procedures. This means that it is not possible to use an erroneous or misleading indicator for the calculation of avoided or absorbed emissions.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 7. Risk of incorrect conversion when calculating avoided and absorbed GHG emission

Risk of entering source data for an incorrect version of the methodology

Risk position	Description	
Risk of entering source data for an incorrect version of the methodology	Methodologies are generally updated rather frequently, consisting of many different documents that are independently updated. It becomes problematic to determine the correct versions of the documents for the time covered by the project. Confusion is also possible when referring between related methodology documents. This causes many problems, which affect the correctness of the project implementation and the calculation of avoided and absorbed emissions.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	The main elements of the methodology, especially those affecting the calculation of avoided and absorbed emissions, were codified in a dedicated GSS CERT IT system, which safely and securely implements the assumptions described in the approved methodologies. This means that human error, which can occur when manually processing documentation and its interpretation, has been eliminated.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	GSS's general rule applies in this case: if there is any problem with the calculated and certified emissions that causes the disclosed emissions to be higher than they should be if they were calculated correctly, the difference will be covered and surrendered from GSS's certificate holdings.	

Table 8. Risk of entering source data for an incorrect version of the methodology

Risk of multiple surrenders of the same units of avoided and absorbed emissions

Risk position	Description	
Risk of multiple surrenders of the same units of avoided and absorbed emissions	A sensitive element of avoided and absorbed emissions certification schemes and registries is the theoretical possibility that the same emissions can be redeemed several times. Such redemption is possible even if the registry itself is maintained on a blockchain. In risk analysis, the places where misrepresentation can occur are the moment of entering units into the register – amounts other than those verified in the audit may be entered, if only through the possibility of falsifying the verification document and surrender of certificate – showing the same surrenders for different entities.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	Our system is built so that the entire process in key elements is done by smart contracts executed on blockchain. The entry of an installation into the system as a contract signature is recorded in the blockchain. Verification of the calculation of avoided and absorbed emissions takes place through smart contract transactions. Change of ownership and redemption are carried out via smart contract transactions. This means that it is not possible to change data at any time. Furthermore, the redemption certificates are marked with QR codes, which can be used to find out to which entity the redemption has taken place and which SSE units are included in it.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	No possibility of occurrence	

Table 9. Risk of multiple surrenders of the same units of avoided and absorbed emissions

Risk of unit owner fraud by multiplying units (falsification of documentation)

Risk position	Description	
Risk of unit owner fraud by multiplying units (falsification of documentation)	Expressed in tons of GHG emissions avoided and absorbed, the units are a valuable asset in the marketplace. Their relatively high value may provoke owners to illegally duplicate them. The duplication may take place in order to repeatedly amount the same emission or, for example, to redeem units in one company, then transfer the units to another related company and show their redemption again.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	Within the GSS CERT system, records residing in the information system carry information from the time the installation appears in the GSS CERT system until the issue is redeemed with full traceability of records and changes. Each redeemed issue is recorded in the blockchain in a way that prevents any tampering. For each redeemed emission we can also trace the full history, including the version of the algorithm and its full record, getting information about its origins.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	No possibility of occurrence	

Table 10. Risk of unit owner fraud by multiplying units (falsification of documentation)

Risk of theft of avoided and absorbed GHG units

Risk position	Description	
Risk of theft of avoided and absorbed GHG units	Units of avoided and absorbed GHG emissions constitute a good that can be traded on the market or used directly to reduce the level of CO ₂ emissions in the enterprise. Market thefts of these credits occur, which means a large loss for their owners and casts a bad light on voluntary schemes.	
Primary risk: 6	Primary impact: high	Primary probability: medium
Risk mitigation	GSS CERT, as the system operator and operator of the registry of avoided and absorbed GHG units (GSS units), has a complete history of unit operations and events. The only option to steal or exploit a unit by redeeming it is to hack into the customer's account by getting their email address, passwords and MFA (multi-factor authentication) mechanisms. Even if this were to happen, GSS has knowledge of the current owner of the units or the entity to which the redemption was made.	
Corrected risk: 0	Corrected impact: no risk	Corrected probability: no risk
Risk occurrence	No possibility of occurrence	

Table 11. Risk of theft of avoided and absorbed GHG units