



Solid World DAO's response: Conditions for consenting to tokenization of Gold Standard-issued credits

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Table of Contents

[Contacts](#)

[Table of Contents](#)

0. INTRODUCTION

[About Solid World DAO](#)

[Preamble](#)

[Summary of major points made in this document:](#)

[Key Terms](#)

1. GENERAL QUESTIONS

[Q1.1: Opinion on adopting blockchain technology](#)

[Q1.2: Advantages and disadvantages](#)

[Q1.3: Additional questions not covered in the consultation](#)

[Q1.4: Categorization of blockchain use cases for Gold Standard](#)

2.1 TOKENIZATION MODEL

[Q2.1.1: Workability of a custodial account model](#)

[Q2.1.2: Opinion on the 'native tokenization' model](#)

[Q2.1.3: Additional comments on the tokenization model](#)

2.2 HOLDING, RETIREMENT, AND REPORTING

[Q2.2.1: Workability and proportionality](#)

[Q2.2.2: Timeframe for custodial retirements](#)

[Q2.2.3: Fractionalization](#)

[Q2.2.4: Additional comments on holding, retirement, and reporting](#)

2.3 POOLING

- [Q2.3.1: Opinion on cross-registry pooling restrictions](#)
- [Q2.3.2: Options for enforcing restrictions](#)
 - [Option 1: Permissioned \(private\) blockchain](#)
 - [Option 2: Permissioned service within a public blockchain](#)
 - [Option 3: Permissionless service with blocklist functionality](#)
- [Q2.3.3: Additional comments on pooling](#)

2.4 DUE DILIGENCE

- [Q2.4.1: Sufficiency of KYC for Tokenizers](#)
- [Q2.4.2: Requirements for due diligence for Tokenizer's users](#)
- [Q2.4.3: Examples from other sectors](#)
- [Q2.4.4: Additional comments on due diligence](#)

2.5 SUSTAINABILITY

- [Q2.5.1: Restrictions related to blockchain emissions](#)
- [Q2.5.2: Workability of such requirements](#)
- [Q2.5.3: Sufficiency of such requirements](#)
- [Q2.5.4: Benchmarks for sufficiency](#)

2.6 DATA SECURITY

- [Q2.6.1: General opinion on IT security disclosures](#)
- [Q2.6.2: Specific requirements for IT security](#)
- [Q2.6.3: Primary security risks](#)
- [Q2.6.4: Reference points for IT security requirements](#)

2.7 PERMITTED UNITS

- [Q2.7.1: Blocking Article 6-compliant units and PER units from being tokenized](#)
- [Q2.7.2: Other safeguards](#)
- [Q2.7.3: Additional comments on permitted units](#)

2.8 REPUTATIONAL HARM

- [Q2.8.1 Opinion on conditions related to reputational harm](#)
 - [Q2.8.2 Opinion on additional amendments](#)
 - [Q2.8.3 Additional comments on reputational harm](#)
-

0. INTRODUCTION

About Solid World DAO

Solid World DAO is closing the climate financing gap by leveraging emerging innovations presented by Decentralized Finance (DeFi). The long timelines for receiving certified carbon credits, lack of cash flow, and front-loaded costs make running highly financially additional carbon projects (such as high-quality ARR or Blue carbon) challenging. From the perspective of investors, the illiquidity of forward offtake agreements, lack of transparency, and high complexity of analyzing carbon projects make forward offtake agreements less attractive of an option, slowing down carbon market expansion cycles. This needs to be solved.

We are tackling this challenge through two closely related initiatives: an advanced process for managing delivery risks, as well as a protocol for creating opinionated, deeply liquid markets for the forward carbon supply that we will need to meet our climate goals. The team consists of seasoned technologists and carbon market experts, including a due diligence & risk team staffed by multiple ex-BeZero carbon analysts.

Solid World prides itself on collaborating with industry-leading organizations across the voluntary carbon markets (like SCB, Vlinder, EmSurge), climate risk analysis (like Sust Global, Arbol, dClimate), and web3 climate initiatives (like Toucan, Open Forest Protocol, Return Protocol). Solid World DAO strongly

believes in public goods and has committed to publicly distributing risk analyses on all projects and collaborating with other risk assessment organizations to create a standard common framework for environmental project risk analysis. Sunshine is the best disinfectant.

We have the trust of many funds that believe in a strong future for the VCM, including the likes of Greycroft, Flori Ventures, Possible Ventures, Awesome People Ventures, Draft VC, Allegory, Cerulean Ventures, Taavet+Sten, Lemonade Stand VC, Toomas Römer (Bolt), Taavi Tamkivi (Salv), Triin Hertmann (Grünfin) and others.

Preamble

After reading the original document to which ours is a response, we wish to convey respect for the forward-thinking attitude reflected in the structure of these questions. We had to go back and re-write some sections of our Verra consultation because these questions were just provocative enough to create space for interesting conclusions. Solid World DAO celebrates Gold Standard as being the most innovative mainstream registry. The topic of responsible tokenization is incredibly relevant for unlocking an entire ecosystem to the transformative power of smart-contract blockchains.

We hope the information and opinions we have presented in this document find the reader in good health and spirit. Here is to a better path forward. 🍷

Summary of major points made in this document:

- **KYC requirements** - We would support Gold Standard expecting/demanding Tokenizers to align with FATF guidelines. Standard best practices among other “real-world” on-chain asset demand at least the KYC and AML checks for organizations that interact with a real-world legal body in order to “bridge” or “tokenize” assets. Stablecoins are subject to similar constraints, for example. Ideally, on-chain systems should be policed at their “boundaries” where legal entities possess control over some systems. A recursive KYC requirement such as the one Verra proposed in their document would likely have a dampening effect on the value of using blockchain. When it comes to KYC requirements for entities holding on-chain Assets - if applied - Gold Standard should also provide clarity on how to handle situations, where Assets are held by Smart Contracts. We accept Gold Standard has to make difficult tradeoffs between future-proofing regulatory compliance, avoiding harm, and reducing friction. In doing this, Gold Standard should lean on the expertise represented in their working groups.
- **Endorsement of iterative approach** - An iterative approach should be taken to facilitate tokenization without locking into a multi-year timeline. We endorse Gold Standard's custodial model, though we provide a few counterpoints when it comes to alternative approaches. Gold Standard investigating a “native tokenization” is a legitimate direction, though we would advise working closely with a third party to achieve this.
- **Representational integrity through transparency** - The Tokenizer should provide enough information for any interested third party to independently validate their tokens' representational integrity without having to take the Tokenizer's word for it. Gold Standard should provide the ability to publicly view the contents of custodial accounts in order to enable this on the “off-chain” side.
- **Lowered concerns about energy consumption** - In terms of energy use, after the transition of Ethereum to Proof of Stake, concerns about power consumption have fallen more in line with non-blockchain alternatives. If Gold Standard wishes to enforce carbon neutrality on blockchains, it should do so rather with the goal of expanding the interests of the VCM (ie creating more demand for (preferably high quality) carbon credits). If energy disclosures are applied to on-chain market facilitators, they should also be applied to other participants as well.

- **Future-proofing the requirements through retaining control** - Gold Standard should be careful not to cede too much power to permissionless systems, as it can harm their ability to adjust to changing conditions in the future. In chapter 2.3.2 we mention some key ways Gold Standard could achieve this. At the bare minimum, control should be exercised by requiring a freeze function to be implemented for each Tokenizer that would block specific addresses from interacting with Assets at the request of regulators or Gold Standard. This provides an avenue to comply with sanctions and can be enabled by organizations such as Chainalysis to ensure compliance. If Gold Standard opts to allow the holding of tokenized assets on the basis of an allow-listing process, power could be exercised through the allow-list instead. We would recommend shying away from a completely permissioned blockchain option since these haven't seen significant adoption historically.
- **Pooling is fine** - In the presence of opinionated demand, appropriate pools will emerge to facilitate that demand. If opinionated demand does not exist, it is unlikely that the resulting pools will be liquid enough to remain interesting to market participants. Limiting where GS credits can be pooled, if done, seems to generally be to retain the narrative of GS credits being more valuable - which we understand - but we think GS should have more confidence that this is the case.
- **Fair treatment** - Equitable treatment should be applied. If organizations off-chain are capable of offering offsetting services without knowing the ultimate beneficiary - access to the retirement function should not be impeded. If some sort of allow-list style limitation does indeed get implemented - on-chain protocols should be able to provide offsetting services to anyone, requiring no additional KYC or AML checks. We ask that any limitations be proportionate to those of existing market participants.
- **Security Audits** - Mandatory third-party audits on at least the core smart contracts on the Tokenizer's side must be enforced. This is to prevent cataclysmic system integrity failures which can/will backfire on the entire space if not enforced. General security standards should be established together with a specialist firm.
- **Request to continue the discussion on tokenized forwards** - We outline some specific limitations that could be placed on tokenized forwards in order to make their existence less risky while creating significant benefits. We accept that this is a complicated topic and would ask for us to be involved in these discussions so we may direct resources to advance this topic.

Key Terms

Term	Definition
Asset	Within this document, Asset refers to any certified environmental units which Gold Standard provides as well as any associated units, including PERs.
Tokenizer	A Gold Standard authorized legal entity that provides the service of tokenizing assets found in the Gold Standard registry through whatever mechanism is finally adopted.
Smart Contract	Within this document, a Smart Contract refers to a set of instructions that can exist (and can be interacted with) on a smart contract blockchain, such as Ethereum or Polygon.
Address	A unique identifier for an entity on the blockchain. This Address is controlled by either an individual or a Smart Contract. An Address may be in the possession of assets, including those of a Tokenizer.
Representational integrity	An attribute that refers to the Tokenizer's on-chain Assets perfectly reflecting the state as reflected within Gold Standard's registry. Representational integrity might be lost if the Tokenizer creates or removes Assets without the change also being reflected in Gold Standard's registry. This would be a crisis situation.

1. GENERAL QUESTIONS

Q1.1: Opinion on adopting blockchain technology



Do you agree that Gold Standard should explore and enable organizations to create digital tokens representing Gold Standard credits, using blockchain technology? Why?

We generally endorse the adoption of tokenization and blockchain technology. We believe Gold Standard has already identified a majority of the main reasons for this in the consultation document where it states the following:

“Gold Standard has always embraced the potential for technology to drive greater ambition, efficiency and transparency within the carbon market. We recognise the benefits that blockchain technology can bring within the carbon market, for instance, to provide a secure record of data and ownership of carbon credits, and as a basis for platforms seeking to innovate and mobilise finance to support the carbon market’s development.”

What we would like to add to this list are the benefits that arise from **interoperability and shared common interface standards**. We have observed the transformative power of this over the last couple of years in which Decentralized Finance (DeFi) has flourished.

To illustrate what we mean by this, we would point to the two standard examples of Aave [a collateralized loan protocol] and Uniswap [a decentralized exchange (DEX) with an innovative automated market maker (AMM) model for pricing assets exchanged within the system]. Both of these systems were created to support any token implementing the ERC-20 token standard. What this results in is the **broad applicability** of their protocols to assets that they did not have to envision as originally being use cases for their system.

Where previously centralized institutions had to build out complex, in-house trading systems to reliably enable the exchange or collateralization of assets - it is because of these standards that anyone building on top of the blockchains that feature these protocols now gets to benefit from such features as a free bonus as a result of just implementing the standard. What is even more notable is the lack of any centralized entity that has to manage such transactions - the intermediary has been replaced by code. Decentralized Finance has unlocked these sorts of features as a sort of common good for projects operating within permissionless blockchains. For many sorts of transactions, we are witnessing the **deprecation of the transactional intermediary**. It is hard to understate just how transformational this is.

In the joint launch of Toucan and KlimaDAO in 2021, **only a small amount of new code actually needed to be written compared to what this would have required if implemented in traditional means**. The infrastructure that enabled the financialization of on-chain carbon assets already existed - it was just in need of a system and process by which Verra’s carbon assets could be made to conform to the ERC-20 standard. Building on this, we strongly believe that we will continue observing innovation being built on innovation within a shared ecosystem of interoperable products. This will bring forth new demand, utility, and use cases for environmental assets. We have a strong conviction that this will play an important role in the future story of how humanity averted the worst consequences of climate change.

Q1.2: Advantages and disadvantages



Do you consider there to be potential advantages or disadvantages for your organization if this were enabled?

Potential advantages

- The ability to leverage existing and emerging innovations to speed up the creation of necessary infrastructure. This provides a landscape to experiment and explore that would otherwise not exist.
- Greater transparency, trust, and accessibility if operating on a public permissionless blockchain.
- Ability to create an interoperable, easy-to-integrate system that enables all players in the space to build on top of the benefits we are creating.

Potential disadvantages

- Regulatory uncertainty, which needs to be carefully managed
- Exposure to hacks due to transparency of code, if not carefully managed

Q1.3: Additional questions not covered in the consultation



Would you like to share any additional comments not covered by questions included in this consultation?

We think Gold Standard put together an excellent consultation document addressing all major themes in a constructive way. The main topic which would have perhaps deserved its own section would have been discussions about legal implications - though these likely differ depending on what sort of constraints are placed on the Tokenizer.

Q1.4: Categorization of blockchain use cases for Gold Standard



Do you consider there to be uses of blockchain technology that should be distinguished and treated differently from others?

Broadly we can currently see a couple of uses for blockchain technology that benefit Gold Standard's mission of maximizing the impact of the voluntary carbon market:

- **CERTIFYING:** lowering the cost of creating certified credits, increasing the quality of credits
 - Verifiable tamper-proof dMRV for data management and accessibility (like Hedera's proposed Guardian system or the CO2.Storage solution by Filecoin Green)
 - Novel data collection mechanisms (like Open Forest Protocol, Astral Protocol, or Shamba Network)
 - Systems that manage knowledge networks composed of industry experts (ie goal-based DAOs)
- **MARKET FACILITATING:** Lowering market friction and inefficiency, increasing utility and accessibility

- Tokenization of registry Assets, enabling their use for other systems (like [Toucan](#), [Moss](#), [Flowcarbon](#), etc.)
- Systems that raise capital for the initiation of carbon projects (ie Kickstarter-for-carbon style protocols)
- Delivery insurance (ie guaranteeing delivery via on-chain insurance buffers or delivery insurance wrapping for off-chain service providers like [Kita](#))
- Forward market liquidity (like [Solid World DAO](#)) that facilitates the trading of forward offtake agreements
- Spot market liquidity (though pooling and deployment in AMMs) or decentralized marketplaces (like [Senken](#))
- Novel utility cases such as carbon-backed currencies (like [Kumo](#)), carbon-collateralized loans (like what [Market.xyz](#) did for BCT), and structured derivative products (like [Neutral Protocol](#))
- Novel treasury structures which enable passive climate action (like [Return Protocol](#), [Spirals](#))
- **RETIRING:** Increasing the amount of carbon retired
 - Protocol-integrated retirement functionality, ingrainning climate impact into the success of the system (like the [Klima X Sushiswap integration](#) or [Methol Protocol](#)'s embeddable)
 - Leveraging on-chain facilitators to enable fairer consumer products for off-chain retail offsetting products (like [Klima's retirement aggregator](#))
 - Increased utility for offsetting - such as status-based rewards (ie profile pictures or art that can either be acquired or upgraded based on offsetting behavior such as [Ecosapiens](#))

Note: Not necessarily all these projects will succeed, but we view the space to be vibrant with a huge amount of experiments being investigated in parallel. There are a few potential future success stories here.

These use cases can be broken down into financial and non-financial, with the non-financial applications likely need significantly less guidance to operate. With non-financial applications, the question would generally only revolve around enabling integration, adoption, and clarity about Gold Standard's attitude toward these use cases.

2.1 TOKENIZATION MODEL

Q2.1.1: Workability of a custodial account model



Do you consider the custodial account model to be workable in the short-term while other solutions are explored?

As these are the same conditions that currently apply to traditional market participants, it seems like a fair and equitable approach. It also appears to be the lowest (Gold Standard side development cost) way to enable tokenization. Within our Verra statement, we strongly advised an iterative approach to tokenization, which Gold Standard seems to already have in mind. We very much appreciate this.

The main two downsides seem to be the potential disconnect between GS and Tokenizer representation of reality (if for some reason the custodial account is compromised) and the implied presence of manual work. If existing market participants have managed this so far, there doesn't seem to be a reason for expecting Tokenizers to be incapable of the same.

From the perspective of a legal relationship, this also likely would place all Tokenizers into the category of VASPs as defined by the FATF in their guidelines. We believe Tokenizers should expect to be regulated in accordance with FATF guidelines, so we see no problem with this.

Q2.1.2: Opinion on the 'native tokenization' model



Do you consider it appropriate for Gold Standard to explore 'native tokenization' in the future?

We think this is an entirely appropriate direction to investigate. We also don't think it would interfere or compete with other initiatives to tokenize carbon assets. In fact, it would increase the ease at which Gold Standard's units could flow into other Tokenizer's systems and establish Gold Standard's native tokens as a sort of clearing house. It would also greatly legitimize the adoption of on-chain retirement as an added benefit.

The main worry from our end would come down to the scope of Gold Standard's core competencies. Unless Gold Standard currently already identifies itself as a tech company, it would involve significant organizational changes to enable. Additionally, it might put Gold Standard in a situation where it might struggle to keep up with the rate of innovation that a pure on-chain registry software provider might be able to deliver. Without knowing the internal organizational nature of Gold Standard intimately, we would at least suggest offloading this responsibility to a trusted third party that can demonstrate the ability to deliver such a service.

Q2.1.3: Additional comments on the tokenization model



Would you like to share any additional comments on this topic?

We would like to use this space to speak up for the sort of retirement-based destruction model Toucan operated. The main confusion seemed to stem from the fact that the destruction event was called "retirement" even though the event itself made it hard to justify double-counting its effects. It also has some precedent based on the [process introduced in 2015 to convert Clean Development Mechanism \(CDM\) CERs into Verra VCU's](#). It could be argued that this had the exact same exposure to double-counting. The major differentiator appears to be the explicit consent by the registry more than anything. This being said, consent does not mitigate double-counting

Even so, it seems that merely creating a retirement-adjacent event with a different name would already alleviate the issue of plausibly double-counting retirements. It would sadly not natively provide the opportunity for two-way bridging, however, which we view as a necessary function for a healthy market. It also might not explicitly set up a compliance relationship if the retirement-adjacent event is not improved to require a specific "destination" contingent on the Tokenizer entering into an agreement with Gold Standard. That being said, we still believe this direction still deserves some consideration, even if it won't be the option Gold Standard ultimately endorses.

2.2 HOLDING, RETIREMENT, AND REPORTING

Q2.2.1: Workability and proportionality



Do you consider these proposals to be workable and proportionate?

All of these requirements are workable on a technical level. We would even suggest going further than this and requiring real-time ongoing transparency into the on-chain representational integrity of Assets in the Tokenizer's custody. This could be done with mechanisms such as [Chainlink's "Proof of Reserve"](#). We sternly believe that when/if possible, the common blockchain motto of "Don't trust, verify" should be applied in practice.

Continuing on this theme, the contents of a Tokenizer's custodial account should be publicly available through Gold Standard. This would enable completely independent third parties to voluntarily audit the representational integrity of the Assets in the Tokenizer's custody. This lowers the need to trust the Tokenizer at face value for the users.

Q2.2.2: Timeframe for custodial retirements



What do you consider to be an appropriate timeframe in which retirements must be made on the Gold Standard Registry, following their retirement on a third-party platform?

Assuming this might require some manual intervention at some point within the process, we believe something in the rough ballpark of "5 working days" would be an appropriate maximum timeframe. Realistically it should be significantly shorter, assuming Gold Standard provides Tokenizers an API endpoint to programmatically retire credits on their registry account.

Q2.2.3: Fractionalization



We are aware that some organizations may wish to create and market tokens that represent fractional portions of one carbon credit. Do you have experience or ideas for how requirements may need to vary in such cases, for instance, related to retirement in the Gold Standard Impact Registry?

Let's break down the question about complexities introduced by fractionalization into its component parts - tokenization, de-tokenization, and retirement.

1. Tokenization

As Gold Standard does not support fractions, fractionalized tokenization is not possible and therefore not relevant to the discussion.

2. De-tokenization

It doesn't seem reasonable to enable the de-tokenization of small amounts of Assets as it would require Gold Standard to start supporting fractions. We would go so far as to suggest that Gold Standard should

set minimum limits on transaction sizes for tokenization and de-tokenization events in order to reduce Gold Standard's operational overhead incurred through these means.

3. Retirement

On this question, we can draw inspiration from existing precedent.

There are already multiple digitally-enabled, retail offsetting services on the market that retire fractional amounts of carbon credits (including Gold Standard credits) on behalf of their users, or the customers of their users (entities who are potentially completely unknown to the service provider). Within these cases, retirement events are currently handled in bulk via cryptic messages such as "Cloverly for carbon offset plug-in on retail websites." or "On behalf of Patch's customers and their end-users".

Similarly, Tokenizers can get around small retirements by "rolling them up" into larger retirement blocks. This does not seem explicitly problematic at least from our perspective, considering this has been standard practice for years. It's unclear how the retirements being initialized on-chain, instead of in a centralized server, would make this fundamentally different. If there are indeed legal implications to doing this, they do not seem to have been enforced by any of the major registries existing services work with.

Q2.2.4: Additional comments on holding, retirement, and reporting



Would you like to share any additional comments on this topic?

As mentioned in the previous subchapter, we would recommend Gold Standard set minimum amount requirements for tokenization and de-tokenization. This would have some implications, including potentially stranding "dust" on the Tokenizer's platform. It does however significantly reduce the operational overhead incurred by all parties involved.

2.3 POOLING

Q2.3.1: Opinion on cross-registry pooling restrictions



Do you think that Gold Standard should consider restrictions on the ability of organizations to pool [their] issued credits with credits from other standards? Why?

Current approaches to pooling will always converge on the price of the cheapest asset which is allowed to enter the pool. This is driven by normal free-market arbitrage mechanisms. If a pool's token price is over the normal sell price of an asset within an economically minded asset holder's inventory, they will pool their assets and then sell the token, lowering the pool token's price.

Conversely, if a path to arbitrage exists, more expensive assets will naturally be redeemed from the pool and sold off to the party/pool that is willing to pay more for them, closing the arbitrage opportunity.

NOTE: As a quick aside, on-chain mechanisms are excellent at enforcing such supply and demand mechanisms in a completely unopinionated fashion. This is one of the many wonders of DeFi, specifically the existence of Automated Market Makers.

These systems will naturally cause the need for new pools. If these pools have significant demand from end-users, it will naturally over time attract supply and liquidity. **Merely by doing nothing, assuming demand for the actual underlying assets, opinionated pools will naturally emerge which fit the needs of Gold Standard's project developers.**

As a tangent - there is an emergent secondary question, regarding the existence of (only) opinionated demand. Here we can likely anticipate some issues. A lot of users, especially retail consumers, have very little knowledge or interest when it comes to carbon credit quality. This naturally gravitates them towards either the cheapest option or the option with the best marketing. We already see this with retail offsetting solutions, such as “blended portfolio approaches” which often are thinly veiled ways to market the portfolio's existence (a small amount) of 45\$ Gold Standard ARR credits while in the background retiring the cheapest possible credits they could find on the market (something like 2\$ credits originating from large-scale Chinese hydropower projects with questionable carbon accounting practices and vintage of 2007). They then proceed to charge the consumer 15\$ per t CO₂e and pocket the difference. We will likely see problematic demand continue to also be a feature of on-chain carbon markets. BCT is in itself a form of problematic demand, but it isn't in any way unique from the rest of the market. If this seems like a problem generally worth tackling, it should be done in a technologically agnostic way.

We don't particularly see a need for such pooling restrictions, as the market will naturally solve this problem in the presence of opinionated demand. There are financial incentives at work that will create the outcomes that Gold Standard desired. If users are willing to pay extra for Gold Standard credits (which is true based on our experience), a pool will emerge to facilitate this premium by attracting supply from the lower price pool via arbitrage. If the downward price pressure on the new pool can be supported by continued demand for its contents - eventually the lower-price mixed pool will naturally run out of Gold Standard's higher-quality credits.

If Gold Standard does wish to enforce some sort of pooling restriction, it seems to only be to the detriment of project developers and other associated parties interested in selling their supply, as there will be net fewer sources of exit liquidity. From contextual clues, it seems that Gold Standard does not wish to intermingle its credits with those of other registries mainly for reputational and optic reasons. **Gold Standard has put a lot of effort into holding its hosted projects to a higher standard than many other registries. Its credits often have higher integrity and are likely more reflective of the actual claim of “1 t CO₂e”. We believe the market will show appreciation for this.** If it does not, it would be the result of a lack of opinionated demand. If this is indeed the case, there is also no indication that a pool containing only Gold Standard credits would see significant demand, since there would be “cheaper options”.

Q2.3.2: Options for enforcing restrictions



If the answer to the above question is yes, do you have views on how any restrictions could operate?

While our answer to the previous question was no, it would be wrong not to describe how to achieve such results, if Gold Standard wishes to see it happen. This might be relevant for other reasons. We see the options for enforcing such restrictions to be the following three, each being a bit more permissive than the last, being more accessible as a side-effect of this

Option 1: Permissioned (private) blockchain

This option would entail only allowing operating within a permissioned blockchain where entities who are allowed to deploy code are those who enter into a legal agreement to not pool Gold Standard's Assets with those of other registries. Doing otherwise would have legal consequences. This is the highest friction option of the three, which also provides the most fine-grained control. This would heavily limit who can access tokens, expand utility or participate in any other way. It would mainly approximate a shared cross-organizational database with some P2P code existing within it. The friction, lack of transparency, lack of commonly accepted precedent, and complicated onboarding process make these uninteresting. It carries very few of the benefits blockchain technology can provide. It is unclear if such an approach would see any significant adoption since these platforms already exist and anecdotally don't seem to have gained significant traction. Blockchain people hate these approaches and institutional participants don't like being first.

Option 2: Permissioned service within a public blockchain

This would involve a setup in which Gold Standard or most likely the Tokenizer (on behalf of GS's guidelines) would manage an allowlist of addresses that can interact with the Tokenizer's system. It would fall upon the Tokenizer to police GS's policies with the threat of delisting them from the allowed addresses. GS would in turn enforce the threat of barring Tokenizer from further supply coming into their system. This also has the side effect of requiring the Tokenizer to explicitly approve users as well. This is not ideal from the perspective of integrating with all of the existing innovations in DeFi, though would still be a heavily preferable option to a fully permissioned blockchain solution (Option 1).

This has some precedent including [Aave's permissioned \(institutionally compliant\) implementation of their collateralized lending protocol](#), [Goldfinch's protocol enabling the creation of credit lines to developing economies](#), and [Centrifuge's Tinalake protocol to enable access to securities on-chain](#).

Option 3: Permissionless service with blocklist functionality

Tokenizer holds the ability to blocklist addresses (which will most likely be needed for OFAC sanctions & other compliance anyway) and threatens to blocklist addresses of Smart Contracts that don't follow GS's guidelines. GS would in turn enforce the threat of barring Tokenizer from further supply coming into their system. [Similar to how Circle manages its stablecoin USDC](#). Most preferable adoption for full integration with the larger DeFi ecosystem.

Q2.3.3: Additional comments on pooling



Would you like to share any additional comments on this topic?

We are in the really early days of figuring out how the legal implications and theory around these topics will play out. Arguments could be made for option 2 being preferable since it provides the most flexibility in responding to changing regulatory landscapes.

2.4 DUE DILIGENCE

Q2.4.1: Sufficiency of KYC for Tokenizers



Is it sufficient for organizations intending to create original on-chain representations of Gold Standard credits to undergo our existing KYC checks, or should further due diligence requirements be introduced? If so, for whom?

We believe Gold Standards KYC checks are sufficient. Based on Solid World's anecdotal experience, these checks have been comparable to (and in some cases more stringent than) onboarding processes with banks and exchanges.

Q2.4.2: Requirements for due diligence for Tokenizer's users



Do you think that Gold Standard should introduce requirements related to the due diligence checks that organizations creating digital tokens representing Gold Standard credits apply for their own users?

When it comes to creating original on-chain representations since the Tokenizer has to hold these credits in escrow, it might follow that the Tokenizer has a direct relationship with that user, it might be required to complete KYC as well in order to be compliant with the FATF's guidelines.

We would reference the options presented in 2.3.2 in this discussion. If Gold Standard opts to exclude Option 3 due to pooling reasons, it wouldn't be a significant addition in terms of friction to require some KYC checks to allowlist addresses. It should be noted, however, that there are some very sticky, potentially unanswerable questions that this would bring along with it, which will require guidance and collaboration with Gold Standard to address.

- **Autonomous Permissionless Smart Contracts may be the direct owners of tokenized Assets for an extended period of time.** These Smart Contracts may or may not exist prior to owning the Asset in question. There might be no clear legal entity to whom KYC would apply in this situation, as the original developers themselves might have limited or no control. Examples of this might be:
 - **Automated Market Makers (AMMs)**, which manage trades between two or more tokens at a price internally determined by the balance of assets within the Smart Contract. Examples of this would include Uniswap and Sushiswap
 - **Over-collateralized Loan Protocols**, which accept an over-collateralized value of tokens in exchange for the ability to borrow some other token at an algorithmically determined interest rate based on the behavior of the free market of supply and demand. A major example of this would be Aave.
 - **Permissionless Inter-blockchain Bridges**, which lock up tokens on one blockchain and emit a voucher token on another blockchain. While the asset is locked, the token in question sits within the bridge's treasury.
 - **Automated Auction Protocols** which could feasibly hold tokenized Assets while participants bid for them. The specific Smart Contract in question might "come into existence" only at the initialization of the auction.
 - **Arbitrage Bot Smart Contracts** which can move Assets across different liquidity pools to even out price disparities across different AMMs. These are the backbone of on-chain price discovery.

- **Decentralized Autonomous Organizations (DAOs)** which can be completely anonymous, widely distributed, independently organized, or potentially lack a traditional corporate legal body. Examples of this would be organizations like Mangrove DAO (which through the TREE Coin ICO helped save a successful WIF-operated Mangrove project back in 2017 which would have otherwise failed) or KlimaDAO.
- **Multisignature Wallets (Multisigs)** are asset-holding entities that require multiple participants to sign off on proposed transactions to execute them. These Multisigs may in turn have some of the participants be other Multisigs or (potentially autonomous) Smart Contracts. These Multisigs may also have changes in signees over time, creating questions about how this would invalidate any previous KYC and if so, who should monitor these events.
- **Smart Contracts that directly control some or all functionality of another Contract that owns Assets**
- **Smart Contracts that originate ie “bring to life” other Smart Contracts (with new addresses) that control tokenized Assets.** This is a standard practice within decentralized protocols due to various reasons including existing technical limitations and the change in stakeholders who should govern the new Smart Contract (if it should be able to be governed at all).
- **The blockchains hosting the Asset in the first place. Or the validators of said blockchain, who affirm and record transactions.**

Answering the questions above with clear guidelines can unlock a lot of value within the larger ecosystem and would greatly be appreciated if Gold Standard opts for option 2 as presented in 2.3.2.

We would also like to emphasize that access to Assets for retirement purposes should not require KYC, if the retirement event is handled by an approved smart contract. It creates friction that is not present within the rest of the VCM. Imposing KYC requirements on retirement or retirement beneficiaries would be actively privileging the status quo for no clearly justifiable reason Solid World can identify.

Q2.4.3: Examples from other sectors



Are there examples from other sectors that you believe could be learned from?

We are in some sense charting new territory, but there are some very notable early examples. The most major examples of on-chain real-world assets are still the stablecoins such as Circle's USDC and Tether's USDT. From there we can generally see a need for the ability to freeze assets on-chain in order to avoid their associated legal entities being accused of enabling money laundering. Even in permissionless systems, there are boundaries to how “permissionless” things can get with real-world assets before entering into legally dangerous territory.

There have also been initiatives to bring real-world assets on-chain which can be interesting as learning opportunities. There is one, in particular, we would like to highlight in this discussion.

Goldfinch is a decentralized credit protocol that enables on-chain funding of credit lines for developing economies. As they are working with credit, a broadly regulated asset class, they have had regulatory roadblocks on the way. In order to overcome them, they have implemented a Unique Identity (UID) system that allows them to be on Ethereum while also enforcing U.S. federal security laws. In order to achieve this, all users interacting with the system have to go through KYC/KYB processes that have been outsourced to Persona and Parallel Markets respectively. As a result of this, they receive a non-transferrable NFT which represents KYC data while not exposing any information on-chain. We can

organize an introduction with them if requested, as we feel this might be informative in finding the right balance for Gold Standard's guidelines.

In addition to Goldfinch, there is also **Centrifuge**, which has also implemented an on-chain KYC check to permission access to its system. While it has been around for longer and garnered less adoption compared to Goldfinch, it is noteworthy for Flowcarbon has collaborated with them to set up a credit line for financing a REDD+ project in Paraguay.

There is an example of **Aave's institutional implementation of its collateralized loan market that is compliant with AML regulations and KYC requirements**. It is enabled by Aave maintaining a list of approved parties who can allowlist addresses into the protocol. These organizations are carefully vetted and require the DAO to vote in order to add new organizations with this power.

Q2.4.4: Additional comments on due diligence



Would you like to share any additional comments on this topic?

As a general direction, we believe Tokenizers should be required to follow guidelines compatible with those that the FATF has outlined for VASPs. This prevents Tokenizers from inadvertently enabling money laundering or terrorist financing and pre-empts regulatory action later on which might endanger the Tokenizer's ability to continue operating.

There might also be a need to develop a sort of "spin down" emergency process if the need emerges to move everything back onto the GS main registry for some unexpected reason. This wouldn't likely need to be in place immediately but should be a topic discussed with the 'Digital Assets for Climate Impact' working group after the tokenization framework has been put in place.

2.5 SUSTAINABILITY

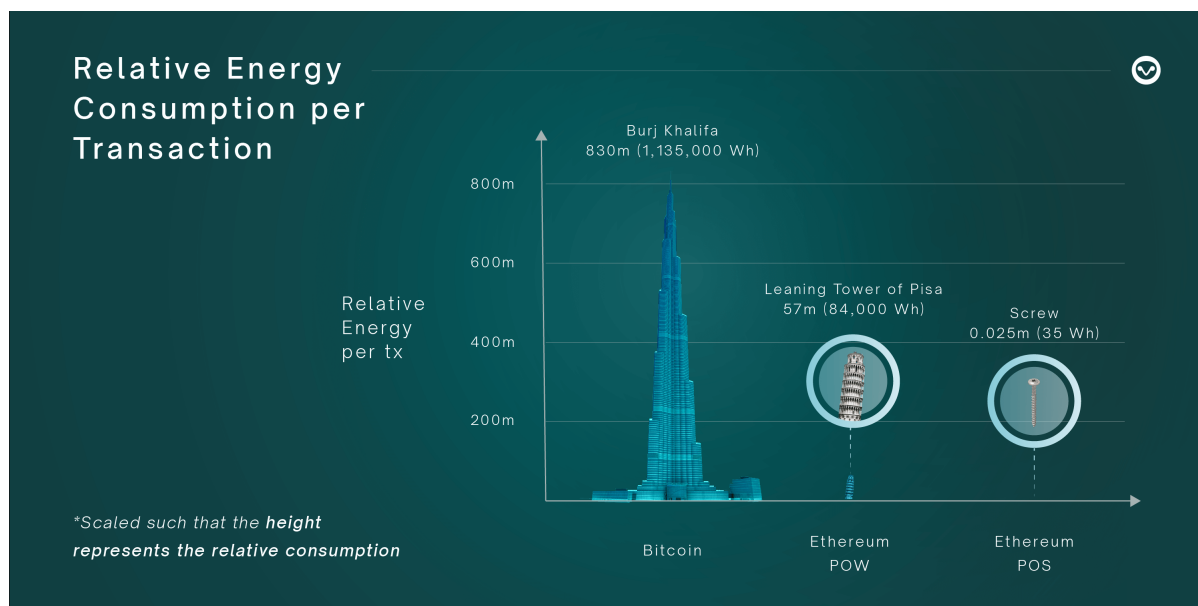
Q2.5.1: Restrictions related to blockchain emissions



Do you agree that Gold Standard should apply restrictions related to the emissions footprint of blockchain technologies?

Regarding energy use - after the transition of Ethereum to Proof of Stake (PoS) - there is now functionally no Proof of Work (PoW) blockchains that are capable of facilitating Smart Contracts and also have significant Total Value Locked (TVL)*. An illustrative infographic by IndexCoop has been included to demonstrate the difference in energy use between Bitcoin, Ethereum PoS, and Ethereum PoW.

*Total Value Locked (TVL) is a measurement of all value stored within a smart contract blockchain's ecosystem. Analytics about operating blockchains as well as their TVL can be viewed on the data provider DefiLlama.



If Gold Standard has continued concerns about energy consumption, we would urge the development of a framework for all market facilitators to measure and disclose the environmental impact of their operations around facilitating Gold Standard's Assets. For Blockchain-based solutions - the impacts can be often easily estimated and critiqued. For closed systems - this is not the case, removing the ability to make fair comparisons.

It could be reasonable to request that the blockchains commit to offsetting their footprint through IETA-approved carbon registries (potentially through the credits on their own chain) in order for Gold Standard to consent to tokenization on their chain. This would more be for marketing purposes and advancing the general adoption of the VCM more than tackling a serious energy-use problem.

If Gold Standard wishes to do so, banning proof-of-work blockchains from being viable platforms for tokenization would be more than enough, as it is the most egregiously inefficient use of energy by a blockchain.

Q2.5.2: Workability of such requirements



Do you consider these proposals to be workable and, if not, why?

The originally proposed requirements are workable, though perhaps a bit overbearing in the context of the last subchapter. From Solid World's anecdotal experience blockchains are very much willing to accommodate such requirements if it means they get to increase their list of viable use cases.

Q2.5.3: Sufficiency of such requirements



Do you consider these proposals to be sufficient and, if not, why?

If Gold Standard opted to only allow tokenization on climate-neutral or climate-positive blockchains it would be a good way to advance the decarbonization of blockchains and the general adoption of the VCM. If it wishes to impose the requirements described in the consultation document, it might as well

impose this requirement as well. Blockchains would likely accommodate this if they haven't done so already.

Q2.5.4: Benchmarks for sufficiency



Are you aware of, or would you recommend, a benchmark that Gold Standard could use to determine whether blockchain technologies have a sufficiently low emissions footprint for consent to be granted?

Solid World does not have any specific benchmark it would bring out as being of particularly noteworthy importance.

2.6 DATA SECURITY

Q2.6.1: General opinion on IT security disclosures



Do you agree that Gold Standard should either introduce conditions or require information related to the IT security measures that an organization is taking to protect data against breaches?

Yes, we agree. The consequences of not doing so would potentially harm the whole VCM. It is important, however, to make sure that these requirements would then be smoothed-out with other registries in order to avoid contradictory sets of requirements emerging.

Q2.6.2: Specific requirements for IT security



If so, do you have views or recommendations on what Gold Standard should require?

Solid World would go so far as to suggest that Gold Standard impose a strict policy that no Tokenizer operates Gold Standard's assets without first attaining a public security audit from a reputable blockchain security company. Any updates to the code should also be audited prior to their production release. Almost all high-profile hacks have happened as a result of developers releasing and then encouraging the adoption of code that had not been audited at all. This is a significant structural risk that Gold Standard should not accept. This requirement should be enforced by the legal contract between Gold Standard and the Tokenizer.

Additionally, cross-chain bridges (the protocols which manage the transference of tokens across different blockchains) represent over half of all DeFi exploits. These have historically been a large source of security failures and these have spilled over into the assets that are being bridged. Tokenizers should be mindful of only working with well-audited bridges that have public audits and follow best practices in terms of assuring security.

In order to prevent any representational policy loss from happening, Tokenizers should be at least advised to adopt a public bug bounty policy through something like [Immunefi](#). Often even if an attack could be significant, running away with exploited funds is incredibly difficult and legally risky. This often means that even maliciously minded individuals (in addition to white-hat hackers) would be willing to report a bug instead of exploiting it in return for a sizable (if smaller) legal payout.

Operational security should be ensured. If the Tokenizer is required to collect KYC data, this must be handled with care. Data breaches should result in a review and Gold Standard potentially re-consider their consent for tokenization if the Tokenizer can not demonstrate that they followed acceptable protocols in good faith.

Q2.6.3: Primary security risks



What are the primary risks that you believe Gold Standard should consider when writing its requirements on this topic?

The key risk is the Tokenizer's loss of structural/representational integrity. If for whatever reason a Tokenizer is hacked and, as a result of this, issues thousands of unbacked tokens into the market - this would constitute a complete structural collapse of all related on-chain infrastructure. Good buildings have strong foundations. Good on-chain ecosystems have secure on-chain primitives.

If for whatever a Tokenizer's representational integrity is compromised, it will be challenging to make all market participants whole. Because of this, proactive requirements for security **audits are essential and should not be viewed as optional.**

Q2.6.4: Reference points for IT security requirements



Are there benchmarks, good practice codes, or similar reference points for IT security requirements that you would recommend Gold Standard following or taking into account?

In the process of setting up IT security requirements, we would heavily suggest doing this in collaboration with an industry-leading blockchain security auditing company that also provides general consultation services such as [Conensys Diligence](#), [Halborn](#), or [Dedaud](#). Blockchain projects present very unique security challenges and we believe these organizations are well-suited to provide you with expert context on these subjects.

2.7 PERMITTED UNITS

Q2.7.1: Blocking Article 6-compliant units and PER units from being tokenized



Do you agree with the proposal not to initially permit the tokenization of these categories of credit, until tailored safeguards are developed?

PERs

Our response here is “yes, but we believe it is important to see them on-chain”. We think PERs are a large enabler of driving finance to project proponents. That is incredibly valuable. Blockchain could enable better, more ambitious, democratic direct financing of carbon projects. There are significant risks, however. Here are a couple of things to note about PER/PCU style units:

- PERs DEFINITELY should not be pooled. Even with PERs of similar projects. These units carry uneven risk distributions that emerge from the likelihood of delivery. **If there is no third party guaranteeing a contingency in case of non-delivery, pooling for example would be a reckless behavior that is guaranteed to result in bad outcomes and a race to the bottom in terms of delivery safety.** This should not be allowed with naked, uninsured units, as they are likely to cause financial harm to retail once some projects inevitably underperform and damages pool integrity in the process.
- We need clear outlines for what an on-chain forward representation should look like in order for it to function as a proper primitive for Decentralized Finance protocols. Solid World is happy to participate in figuring this out, as we have spent significant time on this topic.
- Forward finance is risky and should require proper risk disclosures by operators that work with them. **Language like “risk-free” should not even be part of the vocabulary.** Gold Standard should hold anyone operating with forwards to a high level of scrutiny in terms of language to avoid any reputational damage that might arise as a consequence. Due Diligence about projects should be made public with any initiatives seeking to raise money to buy PERs or facilitate the trading for PERs directly or indirectly.
- As Gold Standard’s PERs already are issued only up to 5 years forward, this should be enough to account for regulatory uncertainty around Article 6. As countries start implementing Article 6, the resulting credits could possibly have heavily different values depending on whether they are given corresponding adjustments. If they are limited to domestic use, it might decrease their volume significantly. The question of how many years forward PERs can be tokenized should be a topic of active monitoring and adjustment. Solid World would lean towards initially allowing only PERs from projects which have signed notes from their government saying that corresponding adjustments will be provided when they become relevant. There might be use cases where this might not make sense, however - so further analysis is required.
- On a regulatory level, there is a more significant need to be more careful. We have some legal opinions that would currently place them as utility tokens. For example, Vlinder commissioned a Lichtenstein law firm to review the topic of PCUs - which they determined would qualify as utility tokens under Europe’s upcoming MiCA regulation. Verra’s [PCU consultation document](#) explicitly mentioned that their lawyers don’t see SEC as being likely to take interest in PCUs and that the CFTC would likely deem them not subject to regulatory requirements. Even so, it might be necessary to err on the side of caution when it comes to KYC and AML requirements.

On all of these topics, we are very excited to continue discussions with Gold Standard to find a responsible way to bring forward financing on-chain. Solid World is admittedly biased on the topic of forward financing, but we feel that there are some issues that liquid forward financing could achieve:

- Clear price signals for forward deals will lead to better terms for project proponents who currently suffer from information asymmetry about market conditions.
- The ability of project proponents and forward financing organizations to have a direct path to immediate liquidity, subject to open market dynamics, prior to certification will speed up such financing taking place in the first place.
- The availability of a sort of “liquid forward financing” layer would increase the accessibility more directly helping speed up carbon supply creation. This should only be done in the presence of insured delivery primitives, to avoid placing the undue risk on the system.

Additionally, “Kickstarter-for-carbon” style protocols could further increase capital inflows to projects. This is not Solid World’s area of focus, though we see these initiatives being valuable in the long run.

These are all desired outcomes and will ultimately benefit the scaling of the VCM. This has to be done responsibly, however, with great care for all involved stakeholders.

Article 6 credits

Article 6-compliant credits will inevitably be the future of the voluntary carbon market, though we accept that clarity on all of the reporting requirements, especially on an operational level is not mature at this point. As there are functionally no such credits on the market currently, it doesn’t seem to bear any significant consequence in the short term.

Q2.7.2: Other safeguards



Do you believe there are other types of carbon credits that Gold Standard should consider creating tailored safeguards for? If so, why?

As countries are increasingly defining how the VCM will interact with their own compliance schemes, it is important that Gold Standard be on top of this and tailor new guidelines to meet these requirements. New regulatory clarity problems will emerge over time.

Q2.7.3: Additional comments on permitted units



Would you like to share any additional comments on this topic?

We would appreciate continuing further face-to-face discussions on this topic or the opening of a “digital forward finance working group” where these topics could be discussed further. It’s important to continue doing our best to enable project proponents to do their critical work. It’s also important to make sure all the financing activity is in compliance with regulatory requirements, avoids reputational harm to Gold Standard, and does not harm the less savvy investors, which crypto has had a history of misleading.

2.8 REPUTATIONAL HARM

Q2.8.1 Opinion on conditions related to reputational harm



Do you consider Gold Standard's existing conditions related to reputational harm to be suitable for the act of creating digital tokens representing Gold Standard credits?

Yes. The existing guidelines seem very broad and easy to apply.

Q2.8.2 Opinion on additional amendments



If not, what amendments or additions do you believe are needed?

What are the requirements for the organizations operating with the Tokenizers' Assets? Some thought should go into figuring out how these requirements will be enforced for organizations that build on top of Tokenizer's tokens and the process through which any enforcement action should be rules for third parties.

Do these third parties who build protocols on top of Tokenizers also need to enter into an agreement with Gold Standard? Does the Tokenizer need to sign an agreement with the third party that enforces Gold Standard's policies by proxy? What does the governance process for this sort of enforcement look like?

Q2.8.3 Additional comments on reputational harm



Would you like to share any additional comments on this topic?

More thought is required with how these mechanisms will interact with Gold Standard's control mechanism for applying any requirements that Gold Standard has for tokenization.