

# Tokenized Public Goods: A New Store of Value

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**Abstract.** A significant portion of the world’s total wealth exists in the form of Public Goods, but currently there are no financial assets that can store this value. This is because Public Goods are by definition non-excludable, and existing financial assets can only store value for goods and services that can be exchanged for currency by an owner. As a result, there is lost global wealth as the development and maintenance of value provided by Public Goods is unstored and undercapitalized. In this paper, a solution to this problem is proposed through a new type of financial asset called a Tokenized Public Good (TPG). A TPG is a fungible digital token representing value created by a Public Good. It is constructed to act as a store of value by having a limited supply, being made available on open markets, and by incentivizing the creation and maintenance of a valuable Public Good. TPGs are issued and distributed by Token Issuers - organizations that compete to define an asset with unstored value, measure real-world creation of the asset, and identify the appropriate Value Creators for token distribution. Investors buy tokens based on an expected return of value - both in the future value of the token and the future value of public good creation incentivized by the asset. A healthy marketplace for TPGs would improve Capitalism by allowing our financial system to better track what we as humans actually value.

## **I. Introduction:**

The existence of “Value” is a natural law for living beings that compete for limited resources. When a resource has demand but its supply is not infinite, it has an inherent economic value. Stores of value, however, are human inventions, and they have allowed us to accumulate wealth by solving the “coincidence of wants” problem, by providing an agreed unit of measurement for value, and by storing economic value as it’s created. This has become the backbone of Capitalism, and has allowed people to accomplish more than ever previously possible.

Public Goods are defined as goods that are both non-rivalrous and non-excludable.<sup>1</sup> Currently the most successful funding techniques for creating economic value from Public Goods are donations, grants, and government spending. These are limited in their ability to create value because they don’t act as stores of value, giving funders of Public Goods no chance at a financial return on their investment. The result is that many of the world’s most valuable assets - including disease prevention, education, and scientific research - are severely underfunded in comparison to their value to the world.

It is possible to construct a financial asset that functions both as an effective store of value and a funding mechanism for public good creation that complies with both the laws of finance and economics. This paper outlines how a Tokenized Public Good can achieve this by creating an ecosystem with three symbiotic roles: Token Issuers, Value Creators, and Investors, each of whom act in their own

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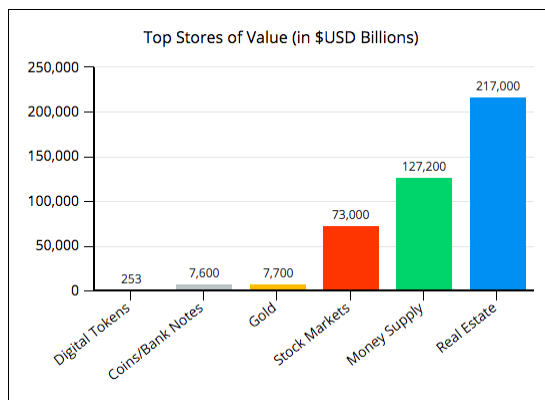
<sup>1</sup> More on Public Goods: <https://www.investopedia.com/terms/p/public-good.asp>

self-interest, and in doing so create value for each other. The purpose of this paper is to offer initial considerations for how such an asset can be constructed effectively.

## II. Existing Stores of Value

Almost all of the world's value is stored in one of the following assets:

- a. **Gold** was among the earliest stores of value to achieve mass adoption across cultures. While it's possible that it's initial appeal was simply that it was shiny, it's early success can be attributed to its scarcity, durability, and divisibility, which are required characteristics of any store of value. Gold's continued success today is partially attributed to its decentralized, trustless nature. Other precious metals with these traits also act as stores of value.
- b. **Fiat Currency** provides even greater divisibility than precious metals, though unlike precious metals, they require trust in a central government. Many people see trust as a negative characteristic of fiat currency, but the advantages far outweigh the disadvantages. Trust in centralized governments has allowed us to confidently issue and receive debt, construct innovative financial instruments such as derivatives and securities, and use monetary policy to influence economic behavior. The total value of fiat today far exceeds that of precious metals.
- c. **Stocks** represent equity in a money-making organization. Unlike gold and fiat, it is backed by its own inherent value, since the products and services built by companies create value for the world that can be measured through revenue and profit.
- d. **Real Estate** is the world's largest store of value, greater than all the world's stocks and broad money supply combined. Its success can be attributed to its limited supply and its inherent value for farming, resource mining, proximity to cultural centers, defensible space, and more.



*Charting the world's various stores of wealth.<sup>2</sup>*

- e. **Digital Tokens.** In 2008, the first Bitcoin block was mined, and has since gained a small amount of traction as a store of value. It's decentralized nature makes it more comparable to gold than fiat currency, and it offers significant advantages over gold by being more easily divisible, transferable and scarce. Since 2008, thousands of digital token platforms have been created, some

<sup>2</sup> Sources for "Top Stores of Value" chart

- Digital Tokens - <https://coinmarketcap.com/> (updated November 2019)
- All others - <http://money.visualcapitalist.com/worlds-money-markets-one-visualization-2017/> (published October 26, 2017)

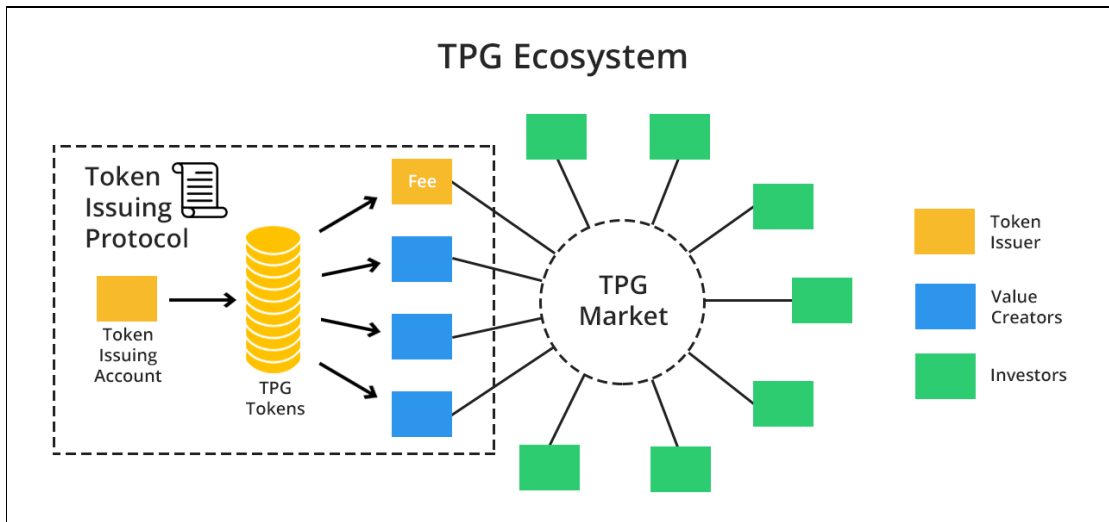
of which are now used as legally-backed representations of real world assets such as real estate and equity, making them effective stores of value. Digital tokens are naturally well-suited for TPG issuance, making them important for this paper.

Not included in this list are physical goods, and neither are debts and derivatives, which act more as futures contracts for other types of assets than as their own store of value.

### III. Characteristics of an Effective Tokenized Public Good

A TPG can function as a store of value if its supply is limited, it effectively finances the creation and/or maintenance of a valuable Public Good, and if each of the three parties in the TPG ecosystem earn a healthy return on their investment.

The three parties of a TPG ecosystem are the Token Issuer, Value Creators, and Investors. Briefly, the Token Issuer builds and runs the protocol through which tokens are issued and distributed, Value Creators work to build value according to the Token Issuing Protocol, and Investors establish a market for the TPG by purchasing tokens based on an expected return of value.



*Illustration of the relationship between members of a TPG ecosystem*

The chart above shows this ecosystem, with the dashed box outlining the portion defined by the Token Issuing Protocol. This Protocol determines how the Public Good's value is quantified and how Value Creators are compensated for creating the Public Good. The dashed circle shows the market for the TPG, where tokens are exchanged for other assets establishing a value for the TPG.

It is important to emphasize that a TPG token is a simple store of value commodity. It does not represent equity in a Public Good, nor does it represent a futures contract for the creation of a Public

Good.<sup>3</sup> TPGs derive their value from their scarcity, durability, and transferability, along with their ability to incentivize the creation of value that is otherwise difficult to incentivize.

A consequence of this structure is that, like certain pure stores of value including gold and many fiat currencies, TPG tokens are uncollateralized, meaning they aren't backed by an underlying owned asset that can be sold for its inherent value. This is a necessary characteristic given the nature of public goods, and since the current providers of public good investment (donations, grants, and government spending) are such poor financial investments, a TPG can offer a significant improvement on these without being collateralized. If properly valued, it is the author's opinion that the overall market size for Public Goods should be greater than any other existing market, as there is a higher ceiling on value creation through public goods than through private value creation since it is so desirable to live in a world funding with very well-funded public good

Different Public Goods have very different considerations for how they can be tokenized effectively, so we will first consider an example of a simple Token Issuing Protocol for a TPG that is likely to have value:

**Token Issuing Protocol Example:**

*Once a year, a number of tokens equal to the percentage points of a city's high school graduation rate is issued and distributed evenly to all high school students that graduated that year.*

With this, we can break down the characteristics that make it likely to be effective:

**The Public Good being tokenized has value**

A city's population benefits from its residents being educated, both financially by having a more capable and high-earning workforce, and non-financially through the many positive externalities of having an educated population.

**The Public Good's value is well-defined**

Graduation rate is an objective number that is easy to measure with confidence, and it is clear to Value Creators (high school students) how they can create this value.

**Value Creators have proper incentives**

Even though teachers, school administrators, and parents all play important roles in the high school graduation rate, they also each have the ability to artificially increase the graduation rate without improving public education, so distributing tokens to them is not productive. And even though many high school students would still graduate regardless of a tokenized incentive, it is reasonable to believe there are students who would choose to finish their education if there was a direct financial incentive who otherwise wouldn't, giving the token real world value.

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<sup>3</sup> However, Token Issuers may construct their initial TPG distributions to Value Creators as futures contracts in situations where that gives a better incentive for value creation.

**Token supply is limited**

Pegging token issuance to a percentage ensures that no more than 100 tokens are issued each year, effectively making the asset scarce.

**Value of Public Good being tokenized is Perpetual**

A 100% graduation rate from a city's public school system (without changing graduation requirements) is valuable to a city's population forever.

**Economic conditions within the TPG ecosystem are well-aligned**

- High school students have low capital requirements to graduate, meaning they don't assume much financial risk in attempting to earn the token, and they are typically low earners, suggesting responsiveness to direct financial incentives
- High school graduating students represent a small portion of a city's population each year, creating a high proportion of available capital to number of Value Creators
- Tracking the high school graduation rate and identifying high school graduates for token distribution is not capital-intensive for a Token Issuer to do accurately
- Investors can reasonably expect that the high school graduation rate will continue to have value in perpetuity

While not exhaustive, these points cover some of the important characteristics that will determine whether a TPG will be effective, and will need to be carefully addressed by the Token Issuer.

**IV. Characteristics of an Effective Token Issuer**

The goal of a Token Issuer is to convert a Public Good into a mineable token by building a Token Issuing Protocol that distributes tokens to those creating value for the Public Good, while balancing the economic incentives of each of the ecosystem's three parties.

To do this effectively, a Token Issuer needs to have both a deep understanding of the Public Good being tokenized and an innovative approach to incentivizing value creation for the Public Good with a strong financial asset. The characteristics of a successful organization in this pursuit combine the traits of an effective nonprofit organization and an effective cryptocurrency protocol:

**A Strong Team**

Experienced and motivated professionals in token engineering, economics, finance, and within the field of the public good being tokenized.

**Effective Governance**

Strong, flexible, transparent systems of governance that adapt to changing public good landscapes and continuously improve in a secure manner.

**Proof of Success**

A clear and demonstrable impact on the world that is effectively communicated to Value Creators and Investors.

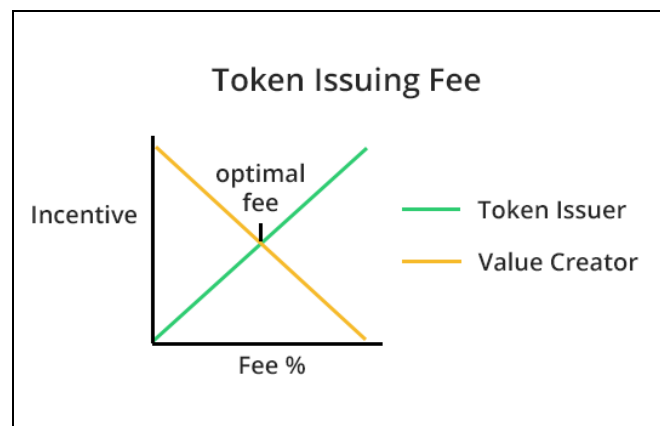
## Governance

This is an area undergoing rapid innovation within the cryptocurrency industry right now and will likely evolve considerably in the coming decades. New types of organizations such as DAOs and Profit Sharing Communities are exploring new ways for groups of people to come together and create value. It's possible that an innovative governance solution like this will be best-suited for TPG-issuing organizations, but at this point it is too early to say.

## Fees

Token Issuers are themselves incentivized to perform well by earning a percentage fee from their own token distribution, and by existing in competitive marketplaces where Public Goods can be tokenized by anyone. This fee is necessary to incentivize Token Issuers, and since compensation is paid with the token being issued, Token Issuers are aligned with Value Creators and Investors in building the token with the highest market value possible.

While high fees are good for Token Issues, they take away from compensation to Value Creators, lowering their incentive and limiting the TPG's ability to create real world value. Effective Token Issuers will need to find a fee percent that balances incentives for both them and the Value Creators. This will vary based on capital requirements, the total market size for the public good, and the competitive landscape of a TPG market.



## Prospectus

The most common overview and disclosure document used in the financial industry for informing Investors of a publicly available financial offering is the Prospectus. Token Issuers should also be expected to provide a Prospectus for any TPG they offer, which should notify Investors of, at minimum:

- The identities of the Token Issuing organization and its Principals
- The Public Good being tokenized
- The TPG's purpose - the desired state of the Public Good being tokenized
- The Token Issuer's Fee
- The Token Issuing Protocol
  - Measurement: How will the Public Good be measured? Who will measure it? What safeguards are there against conflicts of interest or manipulation of the measured data?
  - Issuance: How is the number of tokens issued determined? When and how often will they be issued?

- Distribution: Who will receive the tokens and what portion of issued tokens will they receive? How will they be reached?
- Governance
  - What is the process for proposing and approving changes to the Token Issuing Protocol?

Finally, while a Token Issuer’s governing transparency will be critical for the TPG’s value, at the very least it should be expected that Token Issuers will openly communicate changes to its governance structure prior to enacting them, and that periodic reports are published outlining the performance of the Token Issuing Protocol and token governance over the prior time period.

## **V. Characteristics of an Effective Value Creator**

The goal of a Value Creator is to earn tokens by creating or maintaining a Public Good according to a TPG’s Token Issuing Protocol. Value Creators are incentivized by the market value of the tokens they earn, which they are free to sell once earned.

Successful Value Creators will have the relevant skills, experience, and work ethic to create value for the Public Good being tokenized. Beyond this it will help to be competent in:

- Discovering available TPGs that they are able to create value for
- Calculating the capital required to earn tokens through the Token Issuing Protocol and their likelihood of succeeding
- TPG investing principles

On this final point, Value Creators will benefit from a strong understanding of TPG investing as they too are spending capital based on an expected return through the sale of a token. The more a Value Creator understands about investing in TPGs, the better able they are to maximize their return.

## **VI. Characteristics of an Effective Investor**

The goal of an Investor is to earn a return on investment through the combination of the expected future value of the Public Good being tokenized, and the expected future value of the token itself. By creating a market for TPG tokens, Investors create the incentive for the other two parties in the TPG ecosystem to create value.

The unique characteristics of TPGs as a financial asset make them challenging for Investors to understand how to value them using existing frameworks. Until better frameworks are developed, a good starting point is with the chart below, which uses Chris Burniske and Adam White’s Asset Superclass chart from their 2016 white paper “Bitcoin: Ringing the Bell for a New Asset Class.”<sup>4</sup>

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<sup>4</sup> Source:

[https://research.ark-invest.com/hubfs/1\\_Download\\_Files\\_ARK-Invest/White\\_Papers/Bitcoin-Ringing-The-Bell-For-A-New-Asset-Class.pdf](https://research.ark-invest.com/hubfs/1_Download_Files_ARK-Invest/White_Papers/Bitcoin-Ringing-The-Bell-For-A-New-Asset-Class.pdf)

	<b>CAPITAL ASSETS</b> "Ongoing source of something of value...valued on the basis of net present value of its expected returns."	<b>CONSUMABLE/ TRANSFORMABLE ASSETS</b> "You can consume it. You can transform it into another asset. It has economic value. But it does not yield an ongoing stream of value."	<b>STORE OF VALUE ASSETS</b> "Cannot be consumed; nor can it generate income. Nevertheless, it has value; it is a store of value asset."
EQUITIES	<b>X</b>		
BONDS	<b>X</b>		
INCOME-PRODUCING REAL ESTATE	<b>X</b>		
PHYSICAL COMMODITIES (e.g., grains or energy products)		<b>X</b>	
PRECIOUS METALS (e.g., Gold)		<b>X</b>	<b>X</b>
CURRENCY			<b>X</b>
FINE ART			<b>X</b>
<b>TOKENIZED PUBLIC GOODS</b>	<b>X</b>		<b>X</b>

As stated in Burniske and White's paper, store of value assets are notoriously difficult to value due to their abstract nature. Valuing capital assets however is more proven, with the widely accepted Present Value formula relating value to its expected future value divided by the rate of return over a number of time periods.

To guide an investor's decision to buy a TPG, they might consider a modification of this Present Value formula:

$$PV = \frac{FV(T \propto PG)}{(1+r)^n}$$

**Where:**

*FV(T ∝ PG) = the future value of both the token and the Public Good created, which are together proportional*

*r = rate of return*

*n = number of periods*

This formula allows for the Investors to consider both that they are purchasing a capital asset and a store of value, and that the ability of the token to function as either are interdependent. Today, charitable giving and government spending are invested solely with the expectation of a return on FV(PG) - meaning that the Public Good delivered (plus other variables like goodwill, altruism, and tax deductions) must be greater than the Present Value of the investment.

In comparison, an Investor for a TPG that is properly acting as a store of value will expect an additional return: *FV(T)*. This effect is multiplied; if the expected future value of *T* is 0, the incentive for Public Good creation goes away and *FV(PG)* becomes 0 as well. As *FV(T)* increases however, the incentive to create the Public Good increases, positively affecting *FV(PG)*. This works the other way as well, with the expectation for *FV(PG)* affecting the value for *FV(T)*. The ceiling for the token valuation



comes with the Public Good achieving the greatest desired end state that the Token Issuing Protocol is capable of incentivizing.

Based on this framework for valuation, effective Investors will want to understand certain high-level ideas about a TPG when considering buying, such as:

- How valuable is the underlying Public Good being tokenized, to myself and to others?
- Is the Token Issuing Protocol increasing this value, and will it continue to do so in the long term?
- How are token supply growth and Public Good value growth related in the various possible distribution outcomes of the Token Issuing Protocol?

From this starting point, Investors can then consider more specific details of a TPG before deciding to invest, such as:

- Are there any other Token Issuers that are doing a better job at tokenizing the same Public Good?
- Are Value Creators themselves invested in the TPG?
- What portion of Value Creators sell their tokens upon distribution?
- What are the backgrounds and track records of the Token Issuing team members?
- Does the Token Issuer's fee reflect the capital requirement needed to run the Token Issuing Protocol effectively?
- What portion of this Token Issuing fee is held by the Token Issuer?
- What other factors might be leading to the undervaluing or overvaluing of this TPG?

These questions are meant to serve just as a few initial considerations that may be helpful for an Investor. As with any new financial asset, more rigorous valuation methods will be required over time as the asset's pricing behavior becomes better understood and as Investors test out models for their own valuation hypotheses.

## **VII. Financial Classification and Regulatory Considerations**

The advent of cryptocurrencies has brought many challenges to financial regulators - new financial products are being introduced at a rapid rate, and many are difficult to categorize with existing regulatory frameworks. Nonetheless, until better frameworks are created we must use existing ones, so that regulators can protect investors from predatory fundraising behavior and unsubstantiated financial assets, and so investors can better understand both their rights and how these assets might behave in the market.

### **Is a TPG a Security?**

One of the most important regulatory questions for digital token issuers in the United States is whether their token is classified as a security. In the US, securities are regulated by the Securities Exchange Commission (SEC), whose most recent guidance on digital token classification is provided in the link in the footnotes.<sup>5</sup> When related to TPGs, the most relevant portions of this guidance are:

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<sup>5</sup> "Framework for 'Investment Contract' Analysis of Digital Assets", SEC:  
<https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets>

1. Do investors have a “reasonable expectation of profits”?
2. Are investors reliant on the essential managerial efforts of a third party?

Regarding an Investor’s expectation of profits, it is difficult to predict in advance what a typical TPG market would look like. It is possible that financial gains on TPGs sold in the secondary market would typically be unsubstantial, and that the typical Investor profile is an individual or organization that values the underlying Public Good much more than the hope of an outsized return. If this is the most common scenario, the TPG would likely not be considered a security due to it not providing that reasonable expectation of profit. It is also possible however that TPGs are capable of returning substantial financial gains for Investors and that the typical Investor profile grows to include speculators. In this case, a TPG would likely be considered a security if it also met the second criteria: reliance on the managerial efforts of a third party.

It is possible that some Token Issuing Protocols could function effectively with fully decentralized governance. In regards to asset classification, this may avoid the token being considered a security as long as the tokens are also not pre-mined.<sup>6</sup> As referenced earlier, DAOs and Profit Sharing Communities are 2 examples of organization types that may be considered to have sufficient decentralization. While this comes with its own host of challenges that won’t be addressed in this paper, it is a route that a Token Issuer may choose to take that would result in a much lower likelihood of being classified as a security.

For TPGs that meet the above criteria of being considered a security, Token Issuers still have the option of seeking private placement exemption under Section 4(a)(2) of the Securities Act of 1933 and Regulation D thereunder.<sup>7</sup> This would limit the pool of potential investors to accredited and sophisticated investors but would significantly reduce the time and costs of complying with securities regulations. This approach is consistent with how seed-stage platforms typically raise funding for development. The main drawback of this approach however is that it will reduce the TPG’s liquidity from both the limited pool of Investors and the restrictions on exchanges that can list these assets.

It is the author’s opinion that TPGs represent a new type of financial asset that isn’t suited to be regulated by existing securities laws. As with any financial asset, it is susceptible to predatory behavior from bad actors and should be regulated, but these regulations should be developed for the TPG asset class specifically.

## **Other Regulatory Considerations**

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<sup>6</sup> “Securities Compliance Paths for Blockchain Projects”, Gabriel Shapiro  
<https://medium.com/@gabriel.i.shapiro/securities-compliance-paths-for-blockchain-projects-9f783d85a4aa>

<sup>7</sup> Securities Act of 1933: <https://legcounsel.house.gov/Comps/Securities%20Act%20Of%201933.pdf>

Regulation D:  
[https://www.ecfr.gov/cgi-bin/text-idx?SID=e282de4f5c69b6a69c70dd05d5b92d39&mc=true&node=sg17.3.230\\_1498.sg11&rgn=div7](https://www.ecfr.gov/cgi-bin/text-idx?SID=e282de4f5c69b6a69c70dd05d5b92d39&mc=true&node=sg17.3.230_1498.sg11&rgn=div7)

Aside from its classification as a security, TPGs will require oversight to prevent collusion between competing Token Issuers, to identify dishonest Token Issuers who misrepresent how their Protocol works or how effective it is at creating value, and to prevent market manipulation by all parties in a TPG ecosystem. Compared to most financial assets however, TPGs do not involve as many Investor rights needing protection, for the following reasons:

- The underlying asset for a TPG is unowned, so there are no real-world ownership rights to be transferred.
- As a basic store of value token, a TPG has no term limits, dividends, ownership classes, or other protected financial structures.
- Proof of ownership for the token is provided by the cryptocurrency platform it is issued with and can be easily, efficiently, and securely transferred between owners through that protocol.

Collectively, these characteristics should limit the regulatory considerations that are needed to protect TPG Investors, which should lower the barriers to entry for becoming a Token Issuer versus many other types of financial assets.

## **VIII. Considerations on Token Issuing Platforms**

Without the technology provided by cryptocurrencies, it is unlikely that TPGs would be a financially viable asset. Cryptocurrencies provide globally accessible, permissionless, immutable platforms for issuing secure digital tokens, and their adoption over the last 10+ years has brought an ecosystem of supporting products that make the technology more robust, user-friendly, and efficient. While TPGs theoretically could be issued with digital tokens on a centralized platform, or even with physical notes, these would make Token Issuers responsible for building secure transaction systems, exchanges, and wallets - all very difficult tasks. Even more challenging would be convincing Investors and regulators that these could be trusted. Cryptocurrencies allow Token Issuers to outsource these and focus specifically on proving that their Token Issuing Protocol is capable of creating real world value. Cryptocurrency technology has also indirectly promoted innovative financial products by encouraging us to think about long-standing economic concepts with a fresh perspective.

Not all cryptocurrency platforms are created equal, however, and the different architectures and levels of adoption for each affect their suitability for TPG issuance. The cryptocurrency ecosystem is still young and evolving quickly, partly because of how slow these platforms have been at capturing real world value. Most of today's cryptocurrency valuations appear to be based on their ability to function as pure stores of value and are fueled by speculation. While real-world assets are being tokenized on cryptocurrency platforms as well, their growth is slowed by the regulatory challenges of transferring existing legal ownership rights to digital tokens.

As the ecosystem evolves, it makes sense that one or two platforms would win over specific crypto use cases, like Tokenized Public Goods. While Token Issuers run the risk of issuing their TPG on

a losing platform, this risk is mitigated by the ability to transfer tokens from one platform to another if the need arises.

## **IX. Conclusion:**

A Tokenized Public Good works when the Token Issuing Protocol is constructed so that each participant in the ecosystem is motivated by creating value for themselves, but in doing so they create value for the other two parties. As the value of a TPG market grows, the incentives for Token Issuers and Value Creators to perform well also increases. The end result is a store of value that is “mined” by creating value in the real world that has demand from Investors. This creation of real-world value then provides the basis of the value for the underlying token, and results in much better funding for Public Goods.

Tokenized Public Goods are thus proposed as an innovation to Capitalism itself. They provide a new avenue for people and organizations to affect positive change in the world using self-interested financial incentives. The increased access to funding for Public Good development will not only provide supplemental investment for existing Public Goods, they may expand our ideas for what constitutes a Public Good and bring funding to new types of projects that haven’t been financially viable before. Decades ago, computers first began serving as a digital platform where programmers could use code to make something useful happen. TPGs apply this concept to the real world by allowing people to program real-world outcomes that aren’t being met by our existing form of Capitalism.