Digital Collectable Green NFT Tokens

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Abstract. Digital Collectable Non-Fungible Tokens (NFT). A NFT is a non-interchangeable unit of data stored on a blockchain, a form of digital ledger, which can be sold and traded. Types of NFT data units may be associated with digital files such as photos, videos, and audio. Because each token is uniquely identifiable, NFTs differ from blockchain cryptocurrencies, such as Bitcoin.[1]

Key aspects

- The NFT is available on the Rarible NFT platform (visit https://greenh2s.com/nfts):
  - The account is https://rarible.com/greenh2s with the address 0x6e4AaBE76d1FEF3198884153f0dC24832B1f01e6 on the Rarible platform.
  - Content Credentials and Digital Provenance is provided by Adobe and available on https://www.behance.net/greenh2s
  - Join our discord community at https://discord.gg/k7f6eZbytS or look for the **greenh2s server**.
- Projects will be tied to an NFT, and only one, non-fractionalized NFT will be issued per project.
- The tokens are unique, not fungible or interchangeable and each token has unique characteristics that result in the purchaser exercising their personal preferences to value the token as a mode of entertainment or as a collectible item, while enabling the greater good of society.
- No free tokens or other benefits arising from the tokens will be offered to persons who promote the offering.
- The token is not intended for use as a currency.
- Since there will be no dividends or guaranteed increase in the value of the NFT, management's skill or expertise will not increase the value of the NFT. The NFT will thus not increase in value due to the benefit of others.
- The token does not have a fixed value on the Rarible platform and does not automatically increase over time.
- The proceeds will be used for existing green hydrogen and green cryptocurrency projects.
- The target market is people or entities who have an understanding of the need for green, renewable energies and cryptocurrency minting that emits no CO_2 emissions, and an understanding of how the NFT, which they will invest in as a mode of entertainment or as a collectible item, will enable the greater good of society.
- Information related to the green hydrogen and green cryptocurrency mining projects will be available through an APP ecosystem instantaneously and continuously, and the NFT holder will have the right but not the obligation to access information about the project tied to the NFT. This information is provided solely as a courtesy, as the investor will invest in the NFT as a mode of entertainment or as a collectible item, which will enable the greater good of society. This is similar to a baseball card tied to a player (real world person) with relevant performance

statistics, though the value of the card is as a mode of entertainment or as a collectible item.

1. Introduction

We can start by all agreeing that climate change is the biggest challenge of our time, and one of the biggest impediments to decarbonising the global energy system is enabling decarbonisation or zero emission projects.

Projects are not coming online at a fast enough pace to meet decarbonisation targets to limit global warming to 1.5°C, beyond which the Intergovernmental Panel on Climate Change (IPCC) predicts extreme heatwaves, oceans rising, and the destruction of 70 to 90 per cent of coral reefs.[2]

To meet decarbonisation targets, millions of projects will need to be funded globally to ensure a distributed, efficient low -carbon energy ecosystem.

2. Transactions

Transactions are undertaken using NFTs on established trading and transacting platforms for NFTs. A project is ascribed to an NFT.

While Ethereum is used as a discussion basis in this paper, any tradeable cryptocurrency could be used to enable transactions.

The NFT is sold at its initial price with platform fees of 2.5% (using the Rarible platform as a basis for assessment) as described in the example in Figure 1. Royalties are set at 30% and allow for recurring revenue to be generated for the project, which are paid to the project and incur the 2.5% platform fee.

Since the value of the token as a mode of entertainment or as a collectible item that will enable the greater good of society is determined by the holder, and there is no guaranteed gain or loss from the purchase of the token, nor the reliance on efforts from management or others, the demonstration in Figure 1 reflects the NFT issue price as unchanged for demonstration purposes.

In the example in Figure 1, the sale of the first NFT generates 300 Ethereum, and the NFT is subsequently purchased, for demonstration purposes, at the same rate, with the proceeds from the project at 468 Ethereum after three sales cycles.

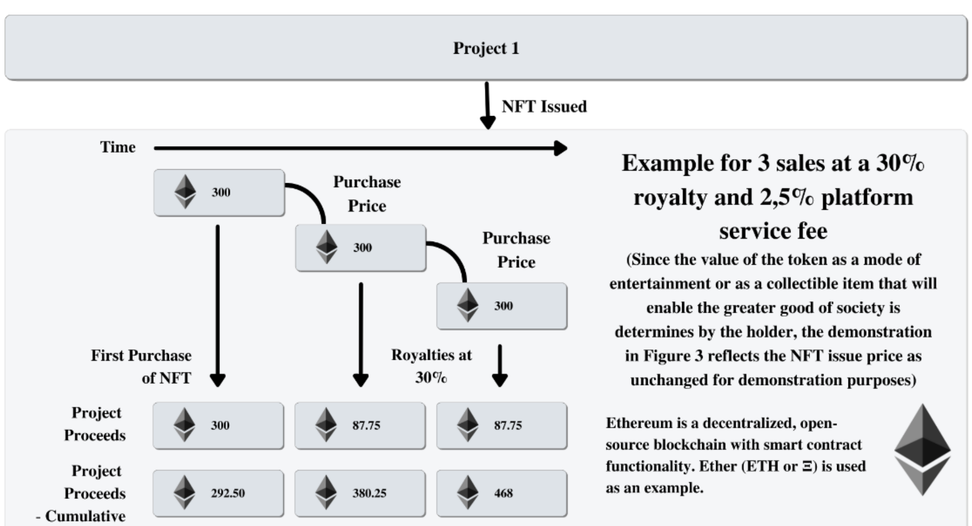

Figure 1 – NFT Transactions

3. Green Hydrogen Projects

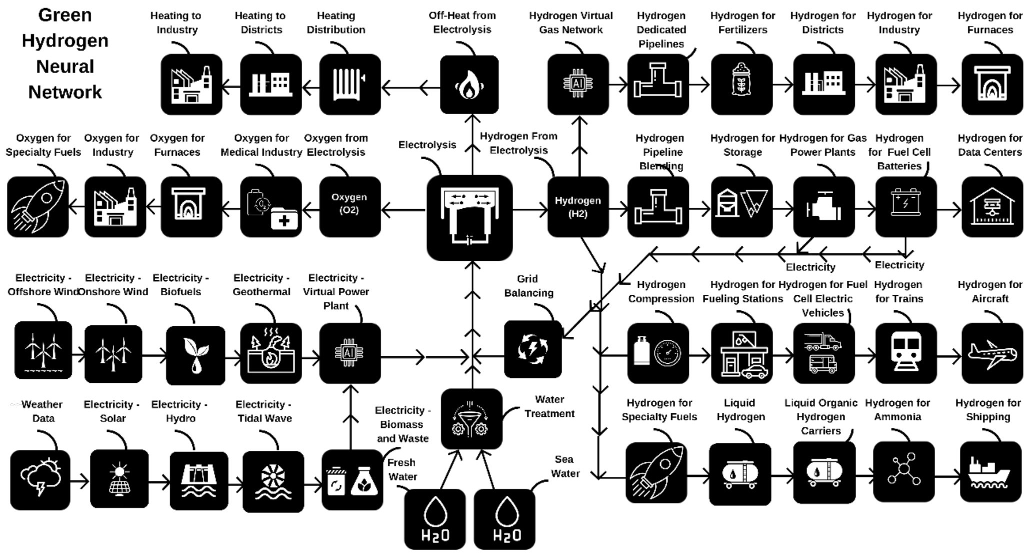

Figure 2 – Project Use Cases

The projects will have many use cases, and these use cases could be individual, or in combination as those described in Figure 2:

- Decarbonizing Building Heat and Power: Hydrogen could use existing infrastructure and provide a cost-effective means of heating decarbonization.
- Decarbonizing Pipeline Natural Gas: Hydrogen blended in relatively low concentrations, less than 5%–15% hydrogen by volume, appears to be viable without significantly increasing risks associated with utilization of the gas blend in end-use devices (such as household appliances), overall public safety, or the durability and integrity of the existing natural gas network.
- Decarbonizing Industrial Energy Uses: In heavy industry, hydrogen can help decarbonize processes that are hard to electrify, in particular those requiring high-grade heat. Hydrogen can also be used in cogeneration units to generate heat and power for industrial uses.
- Decarbonizing Transportation: Today's transportation sector depends almost entirely on fossil fuels and creates more than 20 percent of all CO2 emissions. Hydrogen-powered vehicles, with their high performance and the convenience offered by fast refuelling times, can complement battery electric vehicles to achieve a broad decarbonization of transportation.
- Decarbonizing Data Centers: A recent Microsoft trial has demonstrated the potential of hydrogen-based fuel cells to significantly decarbonise the global data centre market. As costs for hydrogen-powered technologies such as stationary fuel cells decline, hydrogen is becoming a more cost-effective and cleaner alternative. **This could include the decarbonization of cryptocurrency mining.**

- Decarbonizing the Grid: Grid balancing is the term used to describe the task utility companies have of supplying the correct amount of electricity to the grid. With the recent influx of cheap renewable electricity to national power infrastructure, grid balancing has become increasingly important.
- Enabling the Renewable-Energy System: By providing a means of long-term energy storage, hydrogen can enable a large-scale integration of renewable electricity into the energy system. It allows for the distribution of energy across regions and seasons and can serve as a buffer to increase energy-system resilience.
- Transporting Ammonia: Ammonia can be transported easily and be used directly for heating, or as final product hydrogen which will require a further step to liberate the hydrogen before final consumption. In this scenario, ammonia can be imported and / or exported, as applicable depending on the use case.
- Decarbonizing Shipping, Ammonia as a Shipping Fuel: Ammonia is a key alternative fuel for future use in shipping vessels and will reduce the greenhouse gas emissions of the shipping industry as a whole. Ammonia is a zero-carbon fuel that can be liquefied relatively easily, has a higher volumetric energy density than liquid hydrogen, and it can be burnt in an internal combustion engine.
- Decarbonizing Flight: A hydrogen aircraft is an aeroplane that uses hydrogen fuel as a power source. Hydrogen can either be burned in a jet engine, or other kind of internal combustion engine, or can be used to power a fuel cell to generate electricity to power a propeller.
- Decarbonizing Back-up Power: In preparation for a large-scale power sector shift toward decarbonization, several major power equipment manufacturers are developing gas turbines that can operate on a high-hydrogen-volume fuel.
- Decarbonizing Steel: Hydrogen to power commercial steel production replacing liquefied natural gas (LNG) and / or coking coal as the source of high-temperature heat.
- Decarbonizing Fertilizers, Polymers and Methanol: Hydrogen is a fundamental building block for the manufacture of ammonia, and hence fertilizers, and of methanol, used in the manufacture of many polymers.
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4. Information Transparency – the APP Ecosystem

Projects will be tied to an NFT, and the project information will be available through an APP ecosystem instantaneously and continuously, and the NFT holder will have right but not the obligation to access to all of the information they would need about the project tied to the NFT.

Information can be accessed across many systems and devices (smartphone, tablet, laptop, desktop, etc. as depicted in Figure 3 through conventional communication technologies:

- Low latency digital neural networks: Low latency digital neural networks (LLDNNs) are digital neural network architectures (i.e., that combine features such as modularity, flexibility and arbitrary precision, and that take advantage of the wide variety of design tools for very large-scale integration (VLSI) digital architecture) that are designed specifically for real-time (or near real-time) fast control systems.

- 5G connected neural networks (5GCNN): 5G cellular networks or mobile networks are communication networks where the last link is wireless, and come with many new features compared to the legacy cellular networks, such as network data analytics functions (NWDAF), which enable the network operators to integrate third-party solutions to their networks. In some instances, the disclosed methods and systems may be implemented using 5G communications infrastructure that to allow connectivity between thousands of "Internet-of-Things" (IoT) devices (e.g., power generation sensors, power consumption sensors, and related devices.

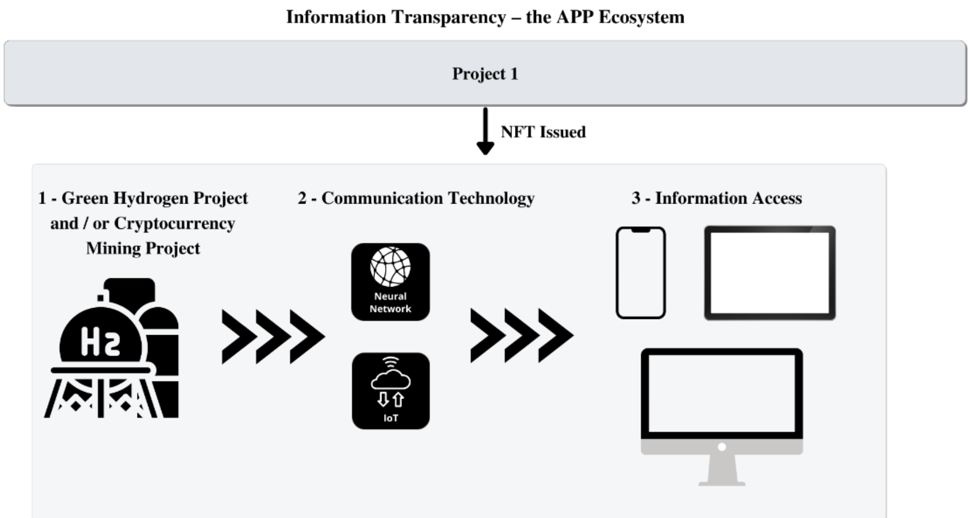

Figure 3 – Project Information Transparency and Access

5. Greening of Cryptocurrency

The transition of the global economy to renewable energy sources, e.g., solar energy, wind power, etc., as replacements for the combustion of hydrocarbons and to mitigate the effects of global warming and climate change has been hampered, in part, by the seasonal and/or diurnal variability of some renewable energy sources and the challenges associated with storing renewable energy during periods of excess peak capacity for later use during periods of reduced energy production or for other uses, e.g., production of chemicals and fertilizers, or for use in fuel cell electric vehicles, cryptocurrency mining etc. Thus, there remains a need for methods and systems that will identify sources of excess renewable energy and route them to locations of energy shortage or for other use cases in a cost-efficient, real-time, and reliable manner.

Variable renewable energy (VRE) is energy produced by a renewable energy source, e.g., solar power and wind power, which is non-dispatchable due to its fluctuating nature, as opposed to a controllable renewable energy source such as geothermal power, hydroelectric power, or biomass conversion. The key factors that are important in understanding VRE are:

- Intermittency: the extent to which a power source is unintentionally shut down or partially unavailable. The intermittency of solar power, for example, reflects the changes in solar radiation over the course of a day and the variability thereof.

- Capacity factor: the average capacity factor (or load factor) is the average expected output of an energy generator, usually averaged over an annual period, expressed as a percentage of the rated maximal capacity.

- Dispatchability: the ability of a given power source to increase and decrease output quickly on demand. The concept is distinct from intermittency – dispatchability is one of several ways in which power grid system operators match supply (e.g., a generator's output) to system demand (e.g., technical loads).

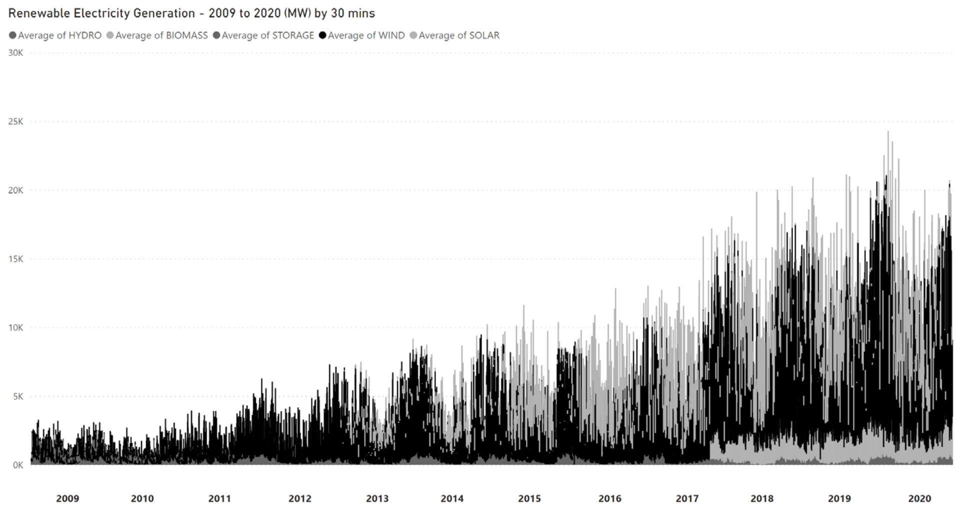

Figure 4 – Demonstration of Variability of Renewable Energy – United Kingdom 2009 to 2020[3]

Figure 4 depicts the variability of renewable energy (difference between the peak and the trough) in the United Kingdom as renewable energy generation capacity was ramped up, and wind electricity generation capacity specifically was ramped up to 12 GW by 2020. Due to contracts for difference (CFDs), at times renewable energy can be negatively priced, which creates the supply of low-priced electricity for green hydrogen and green cryptocurrency mining.

According to the University of Cambridge[4], survey data shows that a significant majority of hashers – creators of cryptocurrency through minting – (76%) use renewable energies as part of their energy mix, however, the share of renewables in hashers' total energy consumption remains at 39% of proof-of-work (PoW) processing.

Using own-generated renewable energy, and / or coupled with the arbitrage opportunities from low-cost or no-cost (CFDs) surplus VRE creates, leads to low-cost green hydrogen production and green cryptocurrency mining. Electrolytic hydrogen will require far more electricity than cryptocurrency mining, and they do not compete. In fact, despite the round-trip efficiency limitations of hydrogen power to power systems, cross seasonal storage of electricity using hydrogen could enable a lower average cost for cryptocurrency mining. For example, in California, cross-seasonal storage of electricity in Winter as green hydrogen could be utilised in the Summer.

As depicted in Figure 5 green cryptocurrency mining can be fully integrated into a green hydrogen ecosystem. Accordingly, renewable energy with green hydrogen can be used to decarbonise hard-to-abate sectors (high-temperature heat, fuels and chemicals) and cryptocurrency mining.

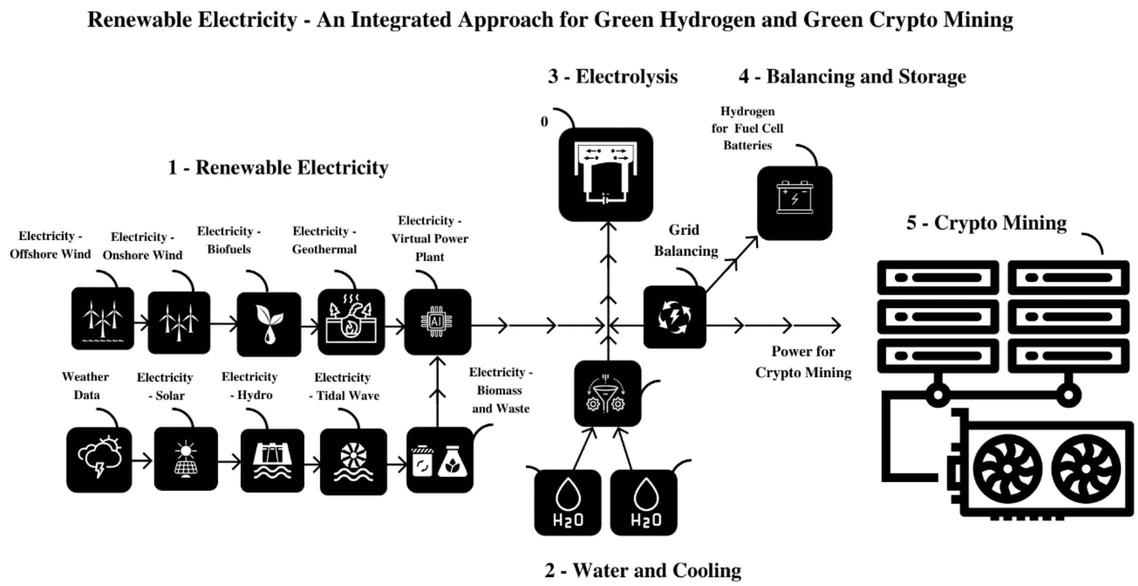

Figure 5 – Green Cryptocurrency in a Green Hydrogen Ecosystem

6. Conclusion

The NFTs used for existing green hydrogen and green cryptocurrency projects to enable decarbonising of the global energy system.

The unique, not fungible or interchangeable tokens have unique characteristics that result in the purchaser exercising their personal preferences to value the token as a mode of entertainment or as a collectible item, while enabling the greater good of society.

The target market is people or entities who have an understanding of the need for green, renewable energies and cryptocurrency minting that emits no CO_2 emissions, and an understanding of how the NFT, which they will invest in as a mode of entertainment or as a collectible item, will enable the greater good of society.

References

[1] https://en.wikipedia.org/wiki/Non-fungible_token#cite_note-:32-1

[2] https://www.ipcc.ch/sr15/

[3] https://greenh2s.com/uksimulation, modelling of electricity data at 30 minutes intervals from 2009 to 2020

[4] 3rd Global Crypto Asset Market Study, 2020 – University of Cambridge (https://www.jbs.cam.ac.uk/wp-content/uploads/2021/01/2021-ccaf-3rd-global-cryptoasset-benchmarking-study.pdf)