

Peer2Panel: Democratizing Renewable Energy Investment With Liquid and Verifiable Tokenized Solar Panels

Jonathan Lehner, Aurelien Pelissier

May 2022
(Last updated Jan 2023)



Abstract

With an expected investment cost of ~\$100 trillion within the next decades, renewable energy is at the heart of the United Nation's transition to net-zero emissions by 2050. Unfortunately, there are several challenges associated to these investments, such as the low exit liquidity and the hassles of going through centralized agencies. Investments in renewable energy is thus currently mostly limited to governments, corporate, and wealthy individuals.

At Peer2Panel (P2P), we address these issues by tokenizing solar panels into unique SolarT NFTs on the Ethereum blockchain, where we function as an intermediary between a token-owning individual and a physical solar panel. Apart from panels installation and maintenance, our role is to redistribute the profits from the generated energy to the SolarTs holders, thus making investments in SolarTs transparent, democratic, and liquid. In fact, ownership of a SolarT token gives a direct ownership interest in the solar panels owned by P2P, which can then be exchanged freely on-chain and thus remove most of the hassles of the traditional energy market. In addition, P2P leverages the most recent innovations from the decentralized finance (Defi) ecosystem to propose SolarTs-collateralized loans, instant liquidity and multi-chain interoperability to its investors.

*This document is work-in-progress and may be updated without announcement.
None of the information contained within is financial advice.*

Contents

1	Motivations	3
2	Peer2Panel ecosystem	4
2.1	Overview	4
2.2	Tokenization	5
2.3	Ownership	5
2.4	Revenue	5
2.5	Marketplace	5
2.6	Panels intrinsic value, depreciation and interest rate	6
2.7	Defi applications	8
2.8	P2P Decentralized Autonomous Organization (PanelDAO)	10
3	Value proposition	10
3.1	Overview	10
3.2	Use cases	10
4	Business	11
4.1	Revenue model	11
4.2	Partners	11
4.3	Pre-financing	11
4.4	Roadmap	12
5	Perspectives	12
6	Legal disclaimer	12

1 Motivations

We live in a fast-changing world. In the last decades, the explosion of smartphones, internet and social medias (Web 2.0) has completely metamorphosed our society. At the same time, the humanity's impact on the environment have been enormous and climate change is now at the center of political debates worldwide. With these in mind, we make three important considerations.

- (i) In the context of the recent events, such as the Covid pandemic and the Russian invasion, inflation has reached record highs in developed countries. This devaluation of fiat currencies affects mostly the less affluent parts of society since they have a higher share of their wealth in cash or bank deposits, while the wealthy primarily invest in stocks, real estate, and private companies which are more robust to inflation. These types of investment are less accessible to the middle-class, as they often involve complex regulations and high transaction costs. Investments in renewable energy are particularly inaccessible due to their low exit liquidity, making them impractical for an average person who may depend on his funds for unexpected expenses. While it is common for wealthy individuals to obtain collateralized loans against their illiquid assets, it has so far been an arduous process for middle-class investors. Instead, they have to go through specialized investment agencies, which poses significant risks regarding the project execution, with the possibility of going bankrupt due to mismanagement or corruption.
- (ii) In order to mitigate the effects of climate change and comply with the United Nation's transition plan to net-zero emissions by 2050, many countries have set ambitious goals on renewable energy production. Also, recent events have emphasized the urgency to reduce the energy dependence on foreign countries with a monopoly on fossil fuels such as Russia, Venezuela and Iran. In this context, the investment necessary for this transition was estimated to \$125 trillion [1], meaning that this transition could benefit greatly if investment in renewable energy was made more attractive to a wide range of private investors, bringing in more cash.
- (iii) Blockchain technology (sometimes referred to as Web 3.0), and more recently decentralized finance (Defi), have revolutionized the way we trade, invest and transfer assets. At the center of this revolution is the Ethereum blockchain [2], which through its smart contracts, unlocked countless possibilities in the finance, art and gaming industry. Nevertheless, while information is always verifiable and immutable on the Ethereum blockchain, it becomes more challenging when it involves *connecting the physical world* to the blockchain (Oracle problem [3]). Hence, the digitalization, or tokenization of real-world assets into a blockchain compatible token usually goes through a centralized agency. We can cite as example fiat currencies (Tether, USDC) [4], gold (PAXG) [5], stocks (Bitpanda), and real estate (RealT [6]). These protocols are crucial to the democratization of the blockchain technology into the world, which would otherwise stay limited to digital only assets.

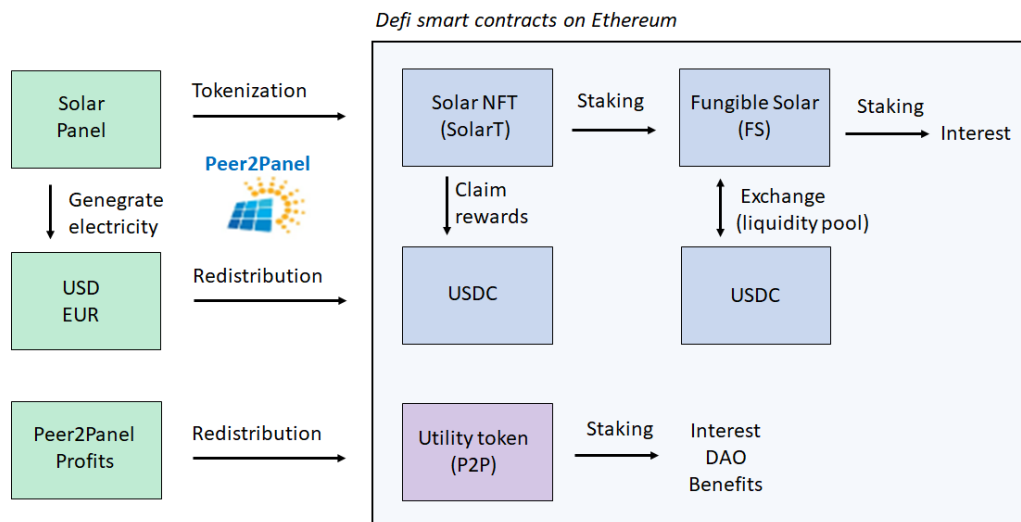
In the light of the three points raised above, we funded Peer2Panel, striving to be an independent third party institution certifying and tokenizing photovoltaic panels into an Ethereum compatible digital asset. In fact, solar energy provides a promising alternative to cash in the context of inflation, as electricity is and will always be in demand worldwide. By providing to its token owner direct ownership of the tokenized panels and redistributing the revenues from the generated electricity, we aim at functioning as an intermediary between a token-owning individual and a physical solar panel. With this new possibility, we hope to make profitable investment in renewable accessible for everyone, and in the process crowdfunding the energy

transition, thus contributing to the current renewable energy funding gap. Through our audited smart contracts, we offer P2P users the possibility to invest even small amounts into renewable energy installations, and owners of tokenized solar panels to borrow funds against their assets at competitive interest rates whenever desired.

2 Peer2Panel ecosystem

2.1 Overview

P2P act as an intermediary between the traditional renewable energy market and the decentralized on-chain ecosystem. Our objective is to guarantee that owners of the tokenized panels benefit at least from the same return on investment as in the traditional market, while at the same time enjoying the high liquidity and transparency of the decentralized applications (Dapps) of the Ethereum blockchain. In fact, it is our responsibility to (i) ensure the quality and authenticity of the solar panels we tokenize, (ii) redistribute the energy revenue fairly and consistently to the solar panel holders, and (iii) offer solar token owners the existing Defi possibilities of the Ethereum blockchain. In the context of P2P, the ecosystem gravitates around three Ethereum compatible (ERC) tokens.



- **Tokenized solar panels (SolarT) - ERC721** represent the ownership of a unique physical solar panels (thus non fungible). A new token is minted for each new solar panels acquired and installed by P2P. Likewise, defective panels are purchased back by P2P and their corresponding SolarT token burned. Ownership of SolarT entitles to consistent income from the generated electricity sold on the market.
- **Fungible solar panels (FS) - ERC20** is a fungible stable coin (worth 1USD) pegged to a pool of staked tokenized solar panels. Briefly, its role in the ecosystem is to (i) provide temporary liquidity to investors who own non fungible solar panels and (ii) serve as a viable store of value alternative to fiat-pegged stable coins. In fact, the intrinsic value of FS is guaranteed because they are over-collateralized by staked SolarTs. Finally, FS can be staked to generate yield in a similar manner to owning SolarTs (see Defi applications below).
- **P2P utility token (P2P) - ERC20** is the utility token of the P2P ecosystem. Long term stakers of P2P will benefit from reduced transaction fees and increased interest rate on the generated electricity. Liquidity provider will receive reward in P2P. The details tokenomics of P2P will be revealed before the ICO.

2.2 Tokenization

The tokenization of physical solar panels into Ethereum compatible token is at the center of the Peer2Panel value proposition. It is our responsibility to certify the existence, quality and reliability of the physical solar panel we tokenize. We do so by working with reputable solar panels manufacturers (such as [RGE certified](#) in France), performing regular audit and inspecting thoroughly each panel we tokenize. Also, we make sure that all important information related to the solar panel, such as manufacturer, serial number and location, are recorded directly on the Ethereum blockchain, which can be accessible at any time, by anyone, from anywhere. Finally, in case of damage, defect or any other circumstances that would substantially affect the panels returns, P2P commits to replace the panel and issue a new Solar token to the defective panel owner.

2.3 Ownership

Our contracts provide the token owner direct legal ownership in the underlying solar panels, so that the value of the panels is protected even in case of fraud or bankruptcy of the solar park operator. Since solar panels are typically valued in the range of a few hundred to thousands of dollars, we do not fractionalize the ownership, meaning one solar panel token corresponds to one physical solar panel (ERC-721 standard). At any time, the owner of a tokenized panel (SolarT) can request a certificate of ownership, which is generated directly by our audited smart contract. The certificate is always guaranteed valid at the indicated generation date, as any transfer of SolarTs is instantly recorded in our smart contract.



2.4 Revenue

Peer2Panel pays the income from the generated electricity to the SolarT token holders monthly in USDC (after deduction of 20% for commission, maintenance, and monitoring fees). Note that depending on the nature and locations of the panels, the generated electricity will either be sold as market price, or under a fixed power purchase agreement (PPA of 20,25 or 30 years) (Figure 1). Finally, we are planning to add the possibility of insurance for a small additional fee against damage to the panels and potentially also against inclement weather which could lead to lower-than-expected returns. As of May 2022, current market conditions involve a yearly return on investment in the range of 5 to 20% APY.

2.5 Marketplace

The main place to trade solar panel tokens is the Peer2Panel marketplace, where panel tokens will be listed for USDC. We charge low transaction fees (1%) compared to other established

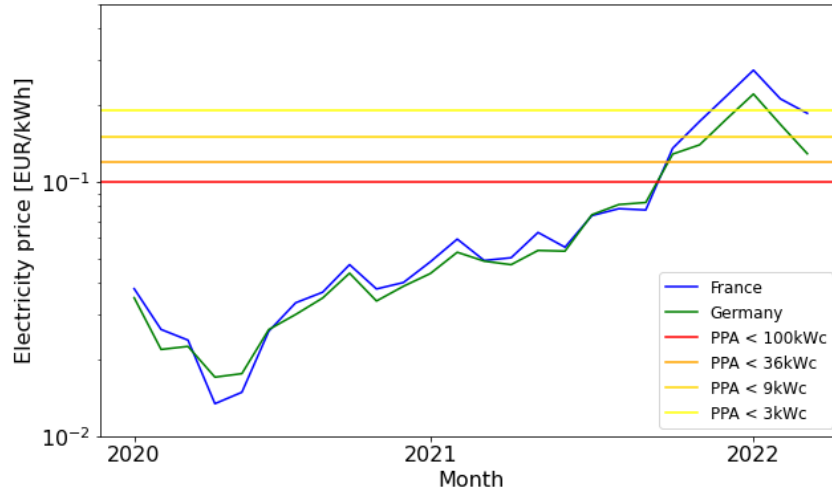


Figure 1: Monthly electricity market price in France and Germany since January 2020 [7]. The French power purchase agreement (PPA) averaged over the last 2 years is indicated for comparison [8].

marketplaces such as Opensea or Rarible (2.5%). In the marketplace, solar panels are grouped by location, manufacturer and size to make it easier for users to find and compare different SolarT. In fact, it can be assumed that multiple tokens at almost the same location, and the same manufacturing model type, will generate similar returns.

2.6 Panels intrinsic value, depreciation and interest rate

To facilitate the implementation of Defi application and avoid potential unreasonable liquidation during market crashes, we associate an *intrinsic* or *book* value to each SolarT token. It is calculated from (i) the number of monthly payments left and (2) its expected monthly return (Figure 2), which may fluctuate during the year depending on electricity market price.

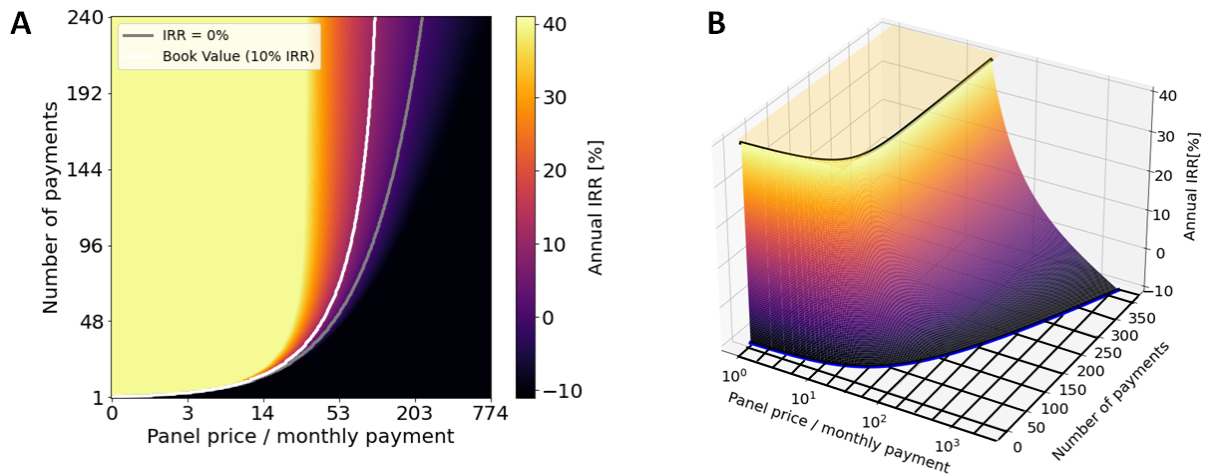


Figure 2: Relationship between the annual IRR, monthly payment and number of remaining payments in (A) heatmap and (B) 3D plot.

According to our pricing model, and assuming constant monthly payouts, the panel's value will decrease slightly after each monthly payment, until it reaches zero after the last payment. On Figure 3, we show the evolution of the portfolio of a SolarT holder with an initial investment of 500USD.

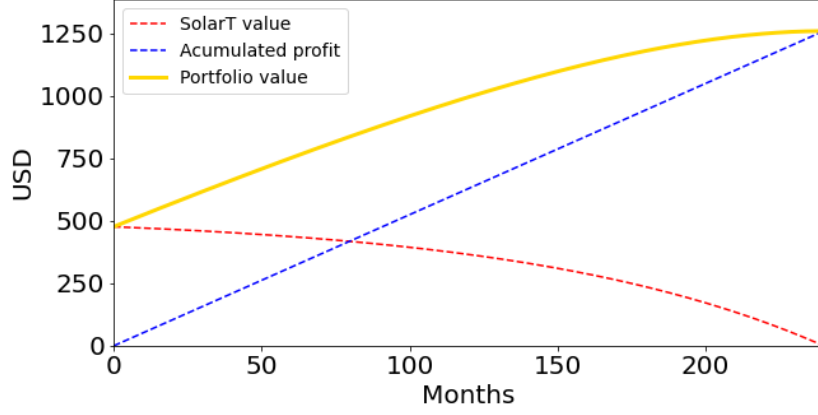


Figure 3: Estimation of portfolio growth for an annual IRR of 12% in a 20 years contract.

Details about pricing:

It is important to reliably price the panels as they depreciate. We construct our pricing model such as an investor who buy a panel at its value at any time will always be in profit the next month with the same return r . In our setup, the investors get the returns for N months until all the panels are given to the operator for free. Thus, the value of the panel at the end of the contract is effectively zero in the context of P2P marketplace (see [this spreadsheet](#) for interactive calculations in our model).

We describe a model were payments are made each month, but keeping in mind that it can be easily be extrapolated to weekly or daily payments. Let X_n be the value of a SolarT token at month n , and y_n be the *raw* MPY (monthly percentage yield) of the solar panels from the generated electricity during that month, relative to the panel original price X_0 . We define an *effective* MPY r such as the value of a portfolio with a panel bought at any given time and accumulating one month of interest equals the value of the panel at current time plus the accumulated income from the generated electricity during that month.

$$X_{n-1}(1+r) = X_n + y_{n-1}X_0 \quad (1)$$

First Assuming that $y_n = y_0$ is constant, we obtain an [arithmetic-geometric sequence](#) with geometric term $a = 1+r$ and arithmetic term $-yX_0$. Then, the panel value at any given month is given by:

$$X_n = X_0 \left[(1+r)^n + y_0 \frac{1 - (1+r)^n}{r} \right] \quad (2)$$

From there, we can compute r from knowing that the panel will be worth zero after N months. Setting $X_N = 0$, we obtain the equation

$$y_0 = \frac{r(1+r)^N}{(1+r)^N - 1} \quad (3)$$

Knowing the interest rate r , the regular payment y_0 can be calculated easily with this formula. On the other hand, finding r from y_0 is equivalent to finding the roots of a N th degree polynomial, which can be done approximatly with [WolframAlpha](#) or with an IRR calculation in Excel. As an example, for a 14% APY, we get a 12.7% effective APY for a contract of 20 years (Figure 3).

Accounting for return's depreciation or inflation:

This model works well for products with constant payments such as mortgages and bank loans. However, in the general case, we need to consider the depreciation of the photovoltaic

efficiency (estimated to $d = 0.5\%$ per year [9], Figure 4), which reduces the amount of regular returns. In this case, the monthly percentage yield y_n changes with time following the relation $y_n = y_0(1 - d)^n$. Thus, the value of panel at time n can be written as

$$\begin{aligned} X_{n-1}(1 + r) &= X_n + y_{n-1}X_0 \\ &= X_n + y_0(1 - d)^n X_0 \end{aligned} \quad (4)$$

Starting from the fact that $X_N = 0$, and given that X_0 and y_0 are fixed in our model, we can compute the panel's value recursively. Although this sequence does not have an analytical solution, we can solve it numerically by starting from $n = N$ and compute X_{n-1} recursively until X_0 is reached.

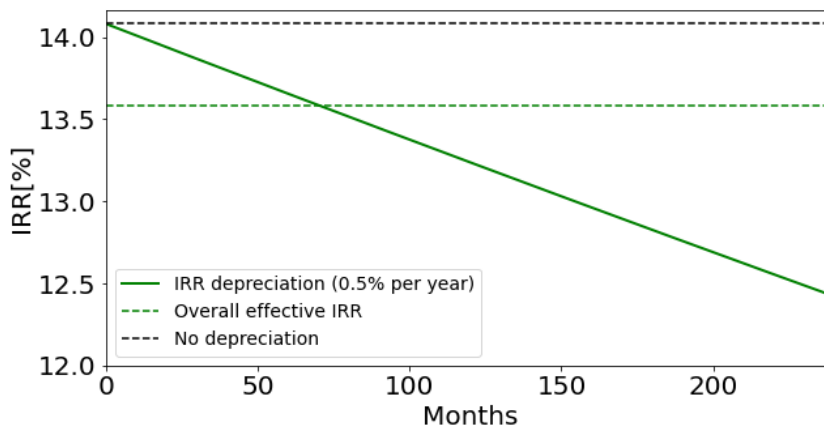


Figure 4: Time evolution of yearly IRR adjustment according to depreciation in generated electricity. The effective IRR correspond to the IRR of an investor holding SolarT during its 20 years lifetime.

Regarding adjustment for inflation, the same calculations apply, with the only difference that the monthly income increases with time (in term of USD value). In that case, the monthly percentage yield y_n changes with time following the relation $y_n = y_0(1 + i)^n$, where i is the inflation rate.

2.7 Defi applications

One of the main breakthroughs of Defi on Ethereum was the development of collateralized loans (Aave [10], Compound [11]), providing instant liquidity over collateralized crypto assets. At P2P, we implement a similar model, where user can stake their SolarT token in order to borrow FS stable-coins, which can then be exchanged into USDC. Our protocol also incorporate auto-compounding services and SolarT investment pools, which offers more flexibility and reduces the risk compared to owning a single SolarT. Below we provide an overview of the different Defi application of our protocol. Note that most of the numbers described below are indicative and may be adjusted later by P2P after feedback from our users.

- **SolarT collateralized loan (FS borrowing).** Owners of SolarT can stake their token and borrow FS to obtain temporary liquidity. FS is a stable coin pegged to the US dollar and it will always be exchangeable with USDC with a ratio always close to 1:1. In fact, FS are minted by staking SolarT tokens and are burned when the user returns them in order to retrieve his SolarT token, hence have a dynamic supply. This way, we ensure that FS tokens are always backed by real physical solar panels. The amount of FS acquired by the staker is determined from the *intrinsic* value of the panel (see section 2.6). After staking, the revenue from the generated electricity is locked in the staking contract as additional

collateral until the borrower returns his FS tokens. Interests are collected directly from the generate revenue, thus ensuring that the collateral value always remain higher than amount of borrowed FS.

In compensation for this service, the P2P smart contract implements the two following mechanism. (i) An interest rate of 10% per year on the borrowed FS is charged to the SolarT staker. (ii) Minted FS after staking a panel are overcollateralized, with only 85% of the panel intrinsic value minted in FS to the user. Note that the interest rate may be adjusted to favor the stability of FS.

- **Solar investment pool (FS staking).** Users who do not wish to buy SolarT and prefer a more flexible and fungible approach can purchase FS and stake them into a crowdfunding pools, which generate continuous yield. The yield comes from the interest of the users who staked SolarTs. Also, the cash acquired from the sell of FS is used to purchase additional panels on the market place, which are in turn also staked and thus increases the pool’s income.

It is Peer2Panel’s responsibility to ensure that there is always enough USDC liquidity reserve for users to exit their FS investment. In the exceptional event where there is not enough liquidity, an automatic sell of staked SolarT purchased by the crowdfunding pool will be triggered in order to pays users who wish to withdraw. Note that to incentive users to keep their FS in the pool for a long period of time time, the rewards are increased for long-term stakers (who stake for more than 6months).

- **Auto-compounding.** Users can chose to automatically transfer their generated income into the solar investment pool in order to compound their revenues from the generated electricity. This possibility is especially interesting around the end of the panels life time where they depreciates fast (Figure 5).

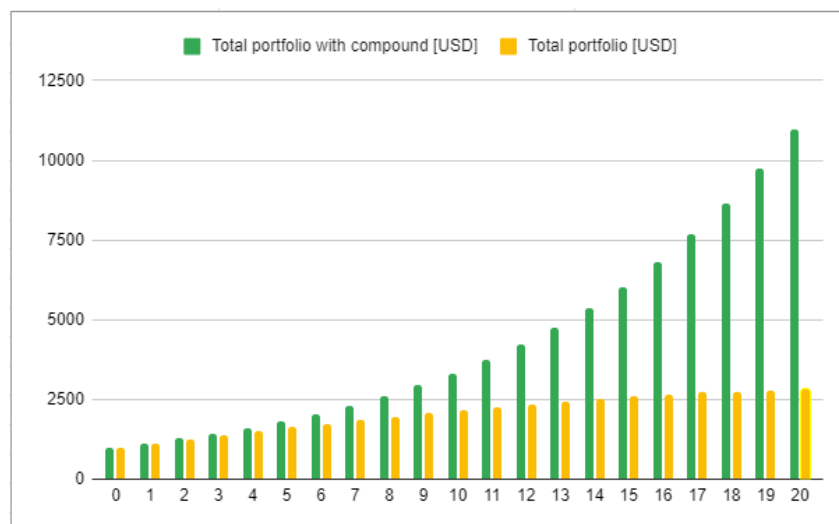


Figure 5: Estimation of portfolio growth for an effective APY of 12%, with and without compounding.

- **SolarT liquidation.** In the situation where the SolarT collateral value (panel intrinsic value + locked income) rises above 95% of the borrowed FS, the smart contract will automatically liquidate the position. Note that this situation should never occur during the lifetime of the SolarT token as the returns from the generated electricity surpasses the loan interest rate. However, liquidation may occur after the SolarT token reaches the end of its lifetime, where monthly payments are no longer distributed.

- **P2P staking.** P2P can be staked to receive benefits and interests. Stakers of P2P will (i) receive part of the revenue from the P2P ecosystem, (ii) benefit from lower fees in the P2P marketplace, (iii) get increased interest rate on the generated electricity, and (iv) be able to take part to several important decisions for the P2P ecosystem with proportional voting power. In order to incentives long term staking, the magnitude of received benefits will depend on the amount and the time the users staked P2P, with a model similar to Platypus Finance [12].
- **Liquidity pools.** In addition to the P2P marketplace, we incentive two liquidity pools, FS/USDC and P2P/USDC, with reward paid in P2P token. Note that FS being a stable-coin, impermanent loss is expected to be low on the pair FS/USDC. We expect that arbitrageurs will keep the FS value consistent with the panels' values (see use cases below).
- **P2P burn.** P2P will use part of its profit to buy back P2P tokens at market price and burn them. This result in an increasing buying pressure on the P2P token, potentially compensating the inflation from liquidity mining rewards.

2.8 P2P Decentralized Autonomous Organization (PanelDAO)

While P2P is centralized in the way it certifies solar panels and redistribute revenue from the generated electricity, the PanelDAO is crucial to favor a balanced and democratic usage of our protocol. Hence, the possibilities described above may be modified if voted by our DAO members. As we want all users of our ecosystem to be able to contribute, voting right will be given to SolarT, FS and P2P holders, proportionally to their implication in the ecosystem.

3 Value proposition

3.1 Overview

Our tokenized solar panels (SolarT) may serve both as a store of value and as a *low-risk* profitable investment. Since they provide direct legal ownership of the underlying physical solar panels and democratic revenue distribution, we believe it makes it a more attractive investment compared to the traditional renewable energy market. In fact, it removes the risk of going through solar agencies or acquiring stocks of solar companies. Also, SolarT tokens are easily and quickly tradable at any time thanks to the decentralized nature of the Ethereum blockchain, and they can be transferred to other P2P users at minimal transaction cost. Importantly, P2P unlock the access to solar investment for blockchain users from any countries, without having to go through the transfer fees and delays of the traditional market.

P2P also offer a competitive alternative to other store-of-values such as Bitcoin [13] or precious metals. On one hand, SolarT tokens consume much less energy during *mining*, and instead benefit the environment via the production of renewable energy. On the other hand, they generate a steady stream of income in addition to *storing* the value.

Finally, our solar-pegged stable coin, Fungible Solar (FS), may provide a viable alternative to fiat-pegged stable coins like USDC, Tether or DAI. Unlike the collateral in MakerDAO [14], which is composed of volatile crypto currencies (mainly Ethereum) and hence vulnerable to market crash, FS tokens have intrinsic value via the physical solar panels they are backed with.

3.2 Use cases

- *User A* wants to invest in solar energy to diversify his crypto portfolio, so he bought some SolarT tokens and receive his interest monthly ($> 10\%$ APY). In the context of rising electricity price and inflation, SolarT tokens are increasingly profitable.

- *User B* bought thousands of SolarT tokens, but need some liquidity temporarily for some other application. He stakes his panels in the P2P staking contract and get FS in exchange. Then, he exchange his FS to USDC and now has liquidity for anything he wishes to do in Defi.
- *User C* is relatively new to crypto, and want to invest a small amount of money. Instead of going through the hassles of NFT marketplace, he directly buy FS and stake them in order to obtain returns.
- *Company A* wants to raise investment to build solar panels. Through partnering with P2P, it can access crowdfund investing from blockchain users.

4 Business

4.1 Revenue model

Ideally, P2P do not own any solar panels but act as an intermediary between a token-owning individual and a physical solar panel. Our business model lies in the commissions we take as a third-party intermediary. More specifically, our revenue comes from (i) the direct profit from the panels sell, (ii) the 1% commission for all transactions in the P2P marketplace, (iii) the 20% commission from the generated electricity sale (which will go to our partners if they operate the panels), and (iv) the interest rate we charge to the FS borrowers. From these revenue, we deduct the operational cost of the solar panels installation. Note the majority of the profit is redistributed to our users staking FS and P2P tokens.

4.2 Partners

The installation and maintenance of multiple solar installation across different places involve a lot of manpower, and the logistics and regulatory processes in different countries are challenging to navigate. Therefore, we work together with partners who plan and operate solar parks, taking responsibility for the necessary infrastructure such as the connection to the electricity grid and the inverters. Additionally, we partner with utility scale installations or corporations with a large total roof area, possibly across multiple locations. These include retail companies, restaurant chains or sport facilities. For these activities, partners receive either part of the electricity revenue of the solar panels or a fixed monthly fee agreed with them. The exact amount and other contractual provisions are noted transparently in the minted solar panel tokens.

4.3 Pre-financing

One challenge in tokenizing solar power assets is the need for temporary financing to acquire and install solar panels before they can be tokenized and sold. To raise the necessary funds, we may perform a pre-sell of SolarT tokens, where payments are held in an escrow account by a smart contract to be released to the panel manufacturer once the installed panels are certified by P2P.

4.4 Roadmap

- **2022: Proof of concept.** Launch of SolarT tokens. We will partner with Unergy [15] to install solar panels in Colombia, with an initial tokenization of roughly 50 solar panels.
- **2023-2024: Full launch.** After our proof of concept phase is validated, we will launch the DAO, the FS token and perform our ICO of P2P. During that year, we plan to scale the deployment of solar panels massively in emerging countries, which are the least accessible places to invest in the traditional energy market, although the returns are among the highest (>10% APY).
- **2025 & After: Expansion.** Extension to other energy sources such as wind turbines.

5 Perspectives

P2P leverage the possibilities offered by web 3.0 to offer blockchain users a new form of investment, which was only accessible to a restricted part of the population before. In the process, it allows for efficient fund raising for renewable energy projects, while at the same time providing security and convenience to P2P users. We hope that this possibility will contribute to bridging the funding gap required for the transition into net zero emission.

As solar farms can be installed to generate electricity worldwide, P2P have a very high scalability potential. Especially, installations in south America and Africa may turn out particularly beneficial thanks to the very high amount of sunlight they receive compared to other parts of the world. But more importantly, we hope at a later stage to tokenize other form of *clean* energy, such as wind turbines and nuclear small modular reactors (SMR) [16]. These are typically more profitable but involve a much higher entry cost, on the order of at least several millions, and are thus usually reserved to governments entities and established companies. The possibility for the middle-class to directly invest and collectively own these power-plant using other form of energy could contribute positively to the transition into net zero emission.

6 Legal disclaimer

Information purposes only

This white paper is for general information purposes only and may be subject to change without prior notice. Peer2Panel and any current or future affiliated entities, their managers, directors, officers, employees, advisors, consultants, agents, or any other person (the "Peer2Panel Team") do not make or aim to make, and hereby disclaim, any representation, undertaking or warranty in any form whatsoever to any person or entity, including any representation, undertaking or warranty in relation to the accuracy and completeness of any of the information set out in this white paper. Nothing contained in this white paper is or may be relied upon as a promise, representation or undertaking as to the future performance of the Peer2Panel solar panel tokens or Fungible Solar tokens. Further, circumstances may change, and this white paper may become outdated. The Peer2Panel Team is under no obligation to update or correct this white paper in connection therewith. This white paper may be translated into a language other than English for information purposes only. In such cases, the English language version shall always prevail on the translated versions of this white paper.

No contractual relationship

The information herein does not imply any element of a contractual relationship nor form the basis of, or be relied upon in connection with, any investment decision. The information set out in this white paper is not legally binding and is for community discussion only. It provides an initial overview of certain business and technical essentials underlying the Peer2Panel platform. Any offering or sale of Peer2Panel tokens shall be governed by separate terms and conditions. In the event of conflict between this white paper and the applicable terms and conditions, the terms and conditions shall prevail.

Third-party information

The Peer2Panel Team accepts no liability for damages, whether indirect or consequential, of any kind arising from the use, reference, or reliance on the contents of this white paper. This white paper may contain references to data, industry publications and/or third-party research. No warranty is given to the accuracy and completeness of such third-party information. Neither the third-party information, its inferences nor its assumptions has been independently verified.

No offer of securities

This white paper does not constitute a prospectus, an offer of any sort including of securities, a solicitation for investment in securities in any jurisdiction, or any offer to sell any product, item, or asset, whether digital or otherwise. No information in this white paper should be considered as business, legal, financial or tax advice regarding the Peer2Panel platform nor the Peer2Panel tokens. Please consult your own legal, financial, tax or other professional adviser regarding this project and the Peer2Panel tokens. Peer2Panel tokens do not in any way represent any shareholding, participation, right, title, or interest in any entity including Peer2Panel or its affiliates, undertaking or enterprise. Peer2Panel tokens do not entitle anyone to any promise of dividends, revenue, fees, profits, or investment returns.

Risk associated with the purchase of Peer2Panel tokens

Prospective purchasers of Peer2Panel tokens should evaluate all risks and uncertainties associated with the purchase of Peer2Panel tokens. This white paper does not constitute advice nor a recommendation by the Peer2Panel Team on the merits of purchasing or holding Peer2Panel tokens or any other token or cryptocurrency. Such purchase and holding carry substantial risks that could lead to a loss of part, or all, of the funds invested. As of the date hereof, the Peer2Panel tokens have no known potential uses outside of the Peer2Panel platform. No promises of future performance, value or utility are or will be made with respect to the Peer2Panel tokens, including no promise that the Peer2Panel platform will be launched, in particular the PanelDAO, and no guarantee that the Peer2Panel tokens will have any intrinsic value. The Peer2Panel Team may decide to amend the intended functionality of Peer2Panel tokens for any reason, including to ensure compliance with any legal or regulatory requirements to which it is subject, which may affect the utility or any other properties of the Peer2Panel tokens. Any Peer2Panel tokens could be impacted by regulatory action, including potential restrictions on the ownership, use, or possession of such tokens. Regulators or other competent authorities may demand that the mechanics of the Peer2Panel tokens be altered, entirely or in part.

References

- [1] Accessed May 2022. <https://www.gfanzero.com/netzerofinancing>.
- [2] V. Buterin, "Ethereum whitepaper," 2014. <https://ethereum.org/en/whitepaper/>.
- [3] G. Caldarelli, "Understanding the blockchain oracle problem: A call for action," *Information*, vol. 11, no. 11, p. 509, 2020.
- [4] Tether, "Fiat currencies on the bitcoin blockchain," 2015. <https://assets.ctfassets.net/vyse88cgwfb1/5UWgHMvz071t2Cq5yTw5vi/c9798ea8db99311bf90ebe0810938b01/TetherWhitePaper.pdf>.
- [5] C. Cascarilla, "Paxgold whitepaper," 2019. <https://paxos.com/wp-content/uploads/2019/09/PAX-Gold-Whitepaper.pdf>.
- [6] R. Jacobson, J.-M. Jacobson, G. Krat, D. Hoffman, and D. Domfrocht, "Legally compliant ownership of tokenized real estate," 2018. https://realt.co/wp-content/uploads/2019/05/RealToken_White_Paper_US_v03.pdf.
- [7] IEA, "Energy prices: Overview," 2022. <https://www.iea.org/reports/energy-prices-overview>.
- [8] "Tarif rachat photovoltaïque au 1er trimestre 2022," Accessed May 2022. <https://www.insunwetrust.solar/blog/le-solaire-et-vous/tarif-rachat-photovoltaïque/>.

- [9] D. C. Jordan, S. R. Kurtz, K. VanSant, and J. Newmiller, "Compendium of photovoltaic degradation rates," *Progress in Photovoltaics: Research and Applications*, vol. 24, no. 7, pp. 978–989, 2016.
- [10] Aave, "Protocol whitepaper," 2020. https://github.com/aave/aave-protocol/blob/master/docs/Aave_Protocol_Whitepaper_v1_0.pdf.
- [11] G. H. Robert Leshner, "Compound: The Money Market Protocol," 2019. <https://compound.finance/documents/Compound.Whitepaper.pdf>.
- [12] Accessed May 2022. <https://platypus.finance/>.
- [13] S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," 2008. <https://bitcoin.org/bitcoin.pdf>.
- [14] M. Team, "The Maker Protocol: Makerdao's Multi-Collateral Dai (MCD) System," 2020. <https://makerdao.com/en/whitepaper/>.
- [15] N. V. Eduardo Ospina, "Unergy: A decentralized protocol for financing clean energy in emerging markets," 2022. <https://drive.google.com/file/d/1e26S9dWY8RkLcXVHNsSw-qBFUP2EJKzd/view>.
- [16] G. Locatelli, C. Bingham, and M. Mancini, "Small modular reactors: A comprehensive overview of their economics and strategic aspects," *Progress in Nuclear Energy*, vol. 73, pp. 75–85, 2014.