

# An Introduction to Initial Coin Offerings in Project Finance

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by

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# Declaration of Honor

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I hereby certify that I have written my paper with the topic:

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independently and did not use any sources or tools other than those specified.

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# Abstract

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Blockchain technology companies have utilized Initial Coin Offerings (ICO) to raise early stage venture capital from investors around the globe while simultaneously building a strong community around the project. The coins created can be programmed in a variety of use cases and could represent equity, debt or a form of service.

Projects rely on their cash flow to repay the investors and are an integral part in providing services to the community. Project Finance is thus important to build infrastructure, electric power plants or other essential utilities.

This paper analyzes strategies to fund such projects through ICOs on a case study of a one-megawatt Photovoltaic power plant.

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# List of Abbreviations

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BTC	bitcoin, the unit of account and currency in the Bitcoin protocol
ETH	Ether, the unit of account and currency in the Ethereum network
ICO	Initial Coin Offering
DAO	Decentralized Autonomous Organization
VC	Venture Capital
IPO	Initial Public Offering
O&M	Operation and Maintenance
PV	Photovoltaic [Power Plant]
mWp	Megawatt Peak [Performance]
mWh	Megawatt Hours, a unit of energy
FIT	Feed in Tariff
PPA	Power Purchase Agreement
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
IOU	I Owe You, non-negotiable debt instrument
RET	Renewable Energy Token
BBBS	Buy-Back-Burning-Strategy
ERC	Ethereum Request for Comments
ERC20	Proposal for a token standard
API	Application Programming Interface
SEC	Securities and Exchange Commission
KYC	Know Your Client
AML	Anti Money Laundering Laws

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# 1 Introduction

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*Initial Coin Offerings will completely transform the world of crowd funding, then it will completely transform the world of Venture Capital and then it will completely transform Initial Public Offerings. This technology bridges the gap between the smallest fund raising all the way to unicorn IPOs and opens up a global pool of investment to a global pool of investors. It is unstoppable, it is enormous and it will shake the world.*

*-Andreas Antonopoulos-*

Bitcoin solves the Byzantines Generals Problem<sup>1</sup> and is the first completely decentralized system to form consensus around one single truth. In Bitcoin,<sup>2</sup> this truth is a ledger of the account balances of all participants, creating a decentralized currency. In the Ethereum<sup>3,4</sup> network, the ledger records the state of all smart contracts, which are decentralized applications that run on the global Ethereum infrastructure. Other so-called cryptocurrencies have entirely different models.

Most of those cryptocurrencies were bootstrapped with an Initial Coin Offering [ICO] to raise sufficient funds to build the project and to grow a strong community of stakeholders around the project. The funds are used to reward the management and development team, pay for consulting and legal fees, provide incentives for the community and buy resources for the project.

Between April and September 2017 alone, over 2 Billion USD have been raised through ICOs.<sup>5</sup> Filecoin,<sup>6</sup> a decentralized data storage platform, has collected 257 Million USD, the largest sum yet. The companies collecting the funds are scattered across several sectors and industries, including digital infrastructure, payments, identity and real estate.<sup>5</sup> Coins can be created with ease in a couple lines of code and the possibilities to structure the coins are vast, like launching a website on the internet.

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<sup>1</sup> Lamport, Pease, Shostak (1982): The Byzantine Generals Problem.

<sup>2</sup> Nakamoto (2008): Bitcoin – A Peer-2-Peer Electronic Cash Protocol

<sup>3</sup> Buterin (2013): Ethereum – A Next-Generation Smart Contract and Decentralized Application Platform.

<sup>4</sup> Wood (2013): Ethereum – A Decentralized Generalized Transaction Ledger.

<sup>5</sup> According to [www.coinschedule.com](http://www.coinschedule.com); 04.10.2017

<sup>6</sup> Protocol Labs (2017): Filecoin – A Decentralized Storage NetworkDecentralized Storage Network

How can such an ICO be structured to finance large scale projects that are not necessarily digital in nature?

This paper is an introduction to Initial Coin Offerings and how they can be structured to finance projects that require long term investments and can only be repaid with the cash flow generated after construction is complete. The paper focuses on a critical analysis of different token structures and provides a fictional case study of a venture raising funds through an ICO to construct and operate a one-megawatt photovoltaic power plant.

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## 2 Definition Initial Coin Offering

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To understand why ICOs are such an innovative technology, let us consider Venture Capital [VC] and Initial Public Offerings [IPO] first.

Venture Capital is a form of early stage equity capital finance, that is the main resource of equity for high growth start-ups. For a rather small amount of money, the founders must give up a rather large portion of their shares in the company, to compensate for the substantial risk the investors are taking.<sup>7</sup> Business Angels are a special type of VC, who additionally to funding, provide the start-up with valuable connections, advice and business expertise.<sup>8</sup>

The investor's shares are usually locked up until they can be sold either in further financing rounds, or during the IPO, which often takes more than ten years. VC is thus inherently illiquid. Furthermore, the investments in early stage start-ups are rather large and it requires a multi-million Dollar fund to broadly diversify the portfolio.

Few investors can provide start-ups with sufficient capital and expertise and due to regional constraints, only a select few accredited investors have the chance to buy equity stakes in the company. This means, that for example a small-time investor from Nigeria has no chance to compete with well-funded VCs based in Silicon Valley.

An initial public offering is the public sale of equity stakes in a company.<sup>9</sup> The money raised during an IPO is used to further the already existing business, but not to bootstrap the company itself. After the IPO, the stock can be traded on several stock exchanges e.g. in New York or London.

The price for offering company shares to the public is rather high, due to regulatory burdens<sup>10</sup> and nowadays, legal, accounting, filing, listing and printing fees add up to roughly

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<sup>7</sup> Engel (2002): The Impact of Venture Capital on Firm Growth: An Empirical Investigation – in ZEW.

<sup>8</sup> Sood (2015): Benefits of Venture Capital in Modern Era.

<sup>9</sup> Allison, Hall, McShea (2008): The Initial Public Offering Handbook.

<sup>10</sup> Sarbanes-Oxley Act (2002): Pub.L. 107-204, 116 Stat. 745.

\$3 million – in addition to the underwriting commission of 7 percent of the offering price and the ongoing cost of running a publicly listed company.<sup>11</sup>

The high price and large amount of regulatory burden prevent small companies and corporations from developing countries to raise funds through the global capital market.

Initial Coin Offerings are regarded as a mixture between an IPO and Venture Capital. During an initial coin offering, an organization creates tokens that are then sold to international investors, the crowd. Those tokens can be programmed to work in several diverse ways, representing for example equity, debt or a right to use the system. The investment is usually paid for in a crypto currency, thus everyone with a smartphone can technically be an investor in the venture. The tokens can be traded on several international exchanges<sup>12</sup> as soon as the ICO is finished, thus creating a highly liquid market.

Mastercoin<sup>13</sup> launched the first ever ICO on July 31<sup>st</sup>, 2013 raising 5,000 Bitcoin, worth around \$500,000 at the time. Ethereum raised over \$18 million during their ICO in mid-2014 and in the first three quarters of 2017 alone, over \$2 billion have been raised through ICOs.

ICOs have been done by projects not only to fund the development, but also to build a community of stakeholders. This is especially important for projects that rely on network effects<sup>14</sup> and a strong community to function, for example a social network.

ICOs solve the problems of (i) liquidity and (ii) market depth in traditional finance.

(i) The tokens created for the ICO can be listed on several exchanges as soon as the ICO is finished to ensure liquidity. Those global exchanges connect multiple token owners and matches supply and demand of the tokens through an orderbook. Several trading platforms have a 24-hour trading volume of several hundreds of millions USD and support several hundreds of different crypto currencies.<sup>15</sup> The market for trading tokens is thus very liquid, especially if a large investors act as market makers.

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<sup>11</sup> Curragh, Leveque and Dhar (2012): Considering an IPO? The Costs of going and being public may surprise you.

<sup>12</sup> See [www.bitfinex.com](http://www.bitfinex.com); [www.bittrex.com](http://www.bittrex.com); [www.shapesift.io](http://www.shapesift.io)

<sup>13</sup> Willett (2012): The Second Bitcoin Whitepaper.

<sup>14</sup> Boudreau and Jeppesen (2014): Unpaid crowd complementors: The platform network effect mirage, in Strategic Management Journal V. 38, Issue 12 December 2015.

<sup>15</sup> See also [www.bttrex.com](http://www.bttrex.com)

(ii) Due to the inherent global market that a funding over the internet provides, there are several millions of potential investors. Technically, any participant of the Bitcoin or Ethereum Network can send money to one designated address of the organization, and receive tokens to a provided address. This participant does not necessary have to be a human person, it could also be a computer program, it only must comply with the rules of the protocol. On the blockchain, nobody knows you´re a fridge.<sup>16</sup> Anyone with a computer or smartphone and internet access could thus technically become an investor in the venture. Furthermore, the amount invested can be as small as a couple of cents, as Bitcoin and the token are highly divisible.<sup>17</sup> Investors no longer need to be high net worth individuals, as even small-time investors can now invest a small percentage of their portfolio and diversify.

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<sup>16</sup> This joke from Richard Brown mimics the iconic cartoon „On the Internet, nobody knows you´re a dog” published in The New Yorker 1993.

<sup>17</sup> One Bitcoin is divisible to the 8<sup>th</sup> decimal place:  $10^{-8}$  Bitcoin is called one Satoshi.

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## 3 Case Study Photovoltaic Power Plant

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To analyze if an ICO can be structured to finance a project, let's consider the following case study.

The project is a 1 mWp photovoltaic power plant, that is installed close to a community of several households and businesses. The community wants to have an own energy source to be more independent from the utility and to reduce their overall cost for energy. Most of the electricity will be consumed by the community, all the excess electricity will be fed in to the main grid. The project company has a 20 yearlong FIT at €0.111, and a long term PPA with the consumers, where the current price for the electricity is €0.18.

The community has to purchase electricity from the utility at €0.23 when the PV plant does not produce, e.g. during the night; the paper neglects that this can be compensated with the use of batteries.

With a rough cost estimate of €800 per kWp, the turnkey total costs for the 1 mWp plant sum up to €800,000. To finance the project, the community hosts an ICO to gather all the funds needed for the project and the community members with available capital can buy as many tokens as they wish during the Pre ICO. [This paper neglects the details of a debt leverage of the project, which is economically advantageous and increases ROI for equity investors.]

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## 4 Company Structure

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The question of where and how to incorporate the venture is closely tied to the regulatory framework of the countries. Some countries, e.g. China, have outright banned ICOs in general, other countries, e.g. Singapore and Switzerland, have implemented forward thinking and crypto-friendly regulations.<sup>18</sup>

There can be legal uncertainty for an equity shareholder company that issues tokens that might represent something similar to equity. There are currently no clear procedures, how such a conflict of interest is handled in court, but the equity shareholders are favored in this scenario, because tokens can't yet legally represent equity. However, further regulations will set a clearer evaluation on tokens and how they will be considered in court. To avoid this conflict of interest, Blockchain companies have thus often incorporated in a foundation, which does not have equity shareholders.

### Possible corporate structure for the solar project:<sup>19</sup>

A foundation is set up in a crypto friendly environment<sup>20</sup> to avoid any unnecessary legal obligations for the venture. This foundation creates the RET, conducts the ICO and collects all the funds that were raised. The funds are then used to provide equity in several Special Purpose Vehicles [SPV] that are founded in the country that the PV plant will be built in. The SPVs build, operate and maintain the plants, sell the electricity to local consumers or to the main grid and pay for all expenses with the cashflow generated. The remaining profit will be transferred back to the foundation, which can either pay back investors, or reinvest the profit back into the SPVs.

The chairman of the foundation should be an affiliate of the management team and he should represent the token holders. The board of the SPVs should be filled with competent members of the core management team.

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<sup>18</sup> More in chapter 7. Legal and Regulatory.

<sup>19</sup> See Appendix 2.

<sup>20</sup> e.g. Switzerland, Gibraltar, Singapore or the British Virgin Islands.

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## 5 Management

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### 5.1 The Decentralized Autonomous Organization [DAO]

A decentralized autonomous organization can maintain and manage financial transactions using computer programs called smart contracts that run on a blockchain protocol. The stakeholders of such an organization hold a token that can be structured to allow for voting rights, a representation of ownership, a right to receive profits or multiple other properties. The voting rights can be used to decide what transactions are processed, to change properties in the DAO,<sup>21</sup> allocate the funds available and complex management decisions.<sup>22</sup>

The rules in the smart contract are enforced exactly how they were programmed, providing a high level of certainty. This also means, that bugs in the code can't always be fixed afterwards, which might lead to unforeseen failure in the code, and thus the entire DAO. Complicated ventures like TheDAO in 2016 show many flaws that still must be worked out. At the current state of technology and regulation, it is not yet feasible to manage a complex venture like a PV power plant, solely through a DAO.

Nevertheless, some mechanisms of a DAO can be implemented in any project. The token holders can have a vote in key decisions like how to allocate funds, the member on the management board or what projects should be pursued next. The more influence the token grants, the higher its theoretical value.

### 5.2 Core Management Team

A core management team of five to fifteen people should be set up in the beginning of the entire venture to represent the organization. They lead the project from the initial fund-raising throughout the negotiation with contractors in the construction, to the eventual maintenance and operation [M&O]. The size of the core management team depends on the complexity of the project.

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<sup>21</sup> Mining in the Bitcoin Network.

<sup>22</sup> The Treasury in the DASH Network.

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The core team should include experts in: (i) the projects technology [e.g. solar energy]; (ii) the cryptocurrency industry; (iii) crowd investor support; (iv) marketing; and (v) legal and regulatory:

(i) The projects base technology is of the most important parts in the venture, which can only succeed when the core management are experts in the field. They should have a sufficient track record and experience working in the specific technology of the venture. There should be a respectable network of partners in the supply chain and purchasers for the products, to have the input and output side of the venture ensured.

(ii) Cryptocurrencies are an entirely new industry of economic activity and the possibilities are quite vast. There are several projects exploring the different applications this phenomenon of distributed consensus can build. Precisely because this is such a new industry, expert due diligence must be done on the several parts of the venture:

(a) The code, to ensure that no lethal bugs are encoded in the smart contracts that manage the funds of the organization to avoid catastrophes like the infamous theDAO hack in 2016;

(b) token and wallet security, to assure that the tokens and wallets used by the company and its investors are save and funds cannot be stolen;<sup>23</sup>

(c) the incentive structure for all participants must align with the main objective of the venture. The difficulty to create a working incentive structure should not be underestimated, even the Bitcoin network with a very good incentive structure, does have some flaws (only non-monetized rewards for the fully-validating nodes<sup>24</sup>); and

(d) Token economics affect all stakeholders in the venture and all possible scenarios must be considered to have a good understanding of the system. Several different economic strategies have been explored by previous and ongoing protocols, but there are many more opportunities to try different approaches to this topic.

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<sup>23</sup> Hogan, Lyles (2017): Glacier – a Protocol for High-Security Bitcoin Storage.

<sup>24</sup> The DASH Network tries to solve this problem with the Masternode approach.

(iii) Crowd and investor support is critical for a successful ICO and subsequent venture. Because this is such a new technology, there are still many unknown parts for (first time) investors, and those questions need to be answered. The team should write several articles and blog posts explaining the ins and outs of the venture, what risks the investors take and how they can participate in the token sale. The venture should be represented on several communication channels to answer questions and adapt to constructive feedback. Furthermore, a detailed white paper and prospectus should provide sufficient information about the venture, the project and the specific technology. During the ICO, investors must be advised on how to securely contribute to the project without technical difficulties. Contributors should get frequent reports on how the venture is doing once the tokens are distributed and traded.

(iv) Marketing and company image must be managed carefully. The venture should be public and represented on several news outlets, forums, investor portals, chats and social media. The company vision must be coherent across all the public outlets and the message should be clear. However, the marketing efforts should not be designed to attract as much money as possible, but rather to educate investors and invite them to further research the project.

(v) The legal environment is filled with countless hurdles, thus the venture should have excellent regulatory counsel and advisors. The lawyers must be educated in securities law, finance and investment regulations, cryptocurrencies and international corporate governance. There should be close communications with the corresponding government agencies to comply with all the laws and shape future regulation.

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## 6 Token Structure

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### Definition of a coin

To clarify terminology, a coin is a cryptocurrency that is native to its blockchain and can represent a store of value, a unit of account or a medium of exchange. In the Bitcoin network, the coin is bitcoin [BTC], in the Ethereum network, it is Ether [ETH]. Typically, there are only two things that can be done with a coin: (i) to send it to someone else and (ii) to pay for transaction fees in the system. If it can do more, it's a token.<sup>25</sup>

### Definition of a token

A token is fundamentally an IOU, it represents rights and obligations. Examples are airline tickets, poker chips, passports or a dollar bill, but not a dollar. A token on its own has often no value outside the system it is used in, i.e. one can't pay for groceries with a poker chip. A token represents something other than its physical form. Tokens can be used in an endless variety of cases: unit of account, payment for fees, trading, grant access, constitute a right, prove ownership, and more.

### Tokens on the Ethereum Blockchain:

A smart contract can be deployed on the Ethereum Blockchain to create specific tokens that can perform different tasks and can be traded. A token can represent any fungible tradable good. Once a token is created, it can be traded globally for almost no cost. The ERC20 token standard<sup>26</sup> defines functions and events of an Ethereum token to help with the implementation of a standard API within smart contracts and to provide tradability between tokens.

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<sup>25</sup> Siegel (2017): The Token Handbook.

<sup>26</sup> Vogelsteller (2015): ERC20 Token Standard.

## 6.1 Analysis of possible token structures in Project Finance

Although the tokens can be structured similar to classic financial instruments, there are several new approaches to consider. The following list is not exhaustive and each project can be tokenized in diverse ways and combining different attributes of the structures explained below.

### 6.1.1 Equity Token

A token might represent an equity share of the company that owns and operates the PV plant. The token holders (i) are owners of the company; (ii) have voting power; (iii) are entitled to dividends; (iv) can inspect corporate books.

(i) The ownership of the company can be replicated by the ownership of the token. If one person owns 1% of all tokens, he owns 1% of the company. Just as with traditional stocks, if one buys additional tokens on the open market, he acquires ownership. Unlike the traditional stock market though, the tokens can easily be traded directly between parties (peer-to-peer) with almost no cost and without a central stock/token exchange. Using decentralized exchanges<sup>27,28</sup> or cross change atomic swaps,<sup>29</sup> the tokens can be exchanged for completely independent tokens with ease. The underlying blockchain might keep a tamperproof and verifiable record of the ownership history, but could also be completely anonymous.<sup>30</sup> In the current regulatory environment, tokens cannot yet legally represent an equity stake in a company. True ownership can thus not be implemented in a token, although it is technically possible.

(ii) There are several different smart contracts<sup>31</sup> and platforms<sup>32,33</sup> that can be used to conduct a vote on decisions of the project. A vote might be conducted on who the management team should be, what projects should be approached next or how much of the cash flow should be reinvested in the project. However, complex management decisions

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<sup>27</sup> Bandeali, Warren (2017): 0x: An open protocol for decentralized exchange on the Ethereum blockchain.

<sup>28</sup> Herzog, Bernatzi, Bernatzi (2017): Bancor Protocol.

<sup>29</sup> Back, Corallo, Dashjr, Friedenbach, Maxwell, Miller, Poelstra, Timón, Wuille (2014): Enabling Blockchain Innovations with Pegged Sidechains.

<sup>30</sup> Ben-Sasson, Chiesa, Garman, Green, Miers, Tromer, Virza (2014): Zerocash: Decentralized Anonymous Payments from Bitcoin.

<sup>31</sup> McCorry, Shahandashti, Hao (2017): A Smart Contract for Boardroom Voting with Maximum Voter Privacy.

<sup>32</sup> Cuende, Izquierdo (2017): Aragon Network – a decentralized infrastructure for value exchange.

<sup>33</sup> Barnes, Brake, Perry (2016): Digital Voting with the use of Blockchain Technology.

should be made by experts to increase efficiency. If the crowd does not reach consensus on a management issue, the entire project might come to a halt.

(iii) Entitlement for dividends can be programmed in the tokens themselves, so that each token receives equal share of the profits. Dividends can either be paid out in a base currency like Ether or Bitcoin; with tokens that were held by the company; or by the creation of entirely new tokens. However, there are technical problems with paying dividends. Although it is not secure,<sup>34</sup> some token holders leave their tokens on a custodial exchange that holds the private keys. If the dividend is payed to an address that is owned by an exchange, the actual token holder will not receive the payment. Thus, all major exchanges must be informed and coordinated to credit and forward the dividend to the actual token holder, which is infeasible to manage. Furthermore, the dividends will be payed to the address even if the corresponding private keys are lost, which leads to an inefficient allocation of resources. Most regulatory environments will consider a dividend issuing token to be a security.

(iv) The Bitcoin blockchain was the first technology to feasible implement triple-entry-bookkeeping.<sup>35,36</sup> Each transaction in the Blockchain can be independently verified by any participant of the network as soon as the transaction is propagated. This means that each transaction done by the projects company can be checked and audited by everyone who wants to.<sup>37</sup> This decreases the risk of undetected fraud and can provide the stakeholders with a prominent level of certainty. They can act quickly, should a fraudulent transaction take place. Fiat transactions will not be recorded on a blockchain and a classical quarterly/annually report should be made public. Furthermore, the PV plant can be checked via real time performance software and an open web cam.

An equity token is the most straight forward token structure, but it has some disadvantages. The issuance of public equity shares is highly regulated<sup>38</sup> in almost every country worldwide,<sup>39</sup> and the issuing corporation has to not only comply with their own local regulation, but with every jurisdiction of each potential investor. This would lead to exces-

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<sup>34</sup> See the Glacier Protocol.

<sup>35</sup> Ijiri (1989): Momentum Accounting & Triple-Entry Bookkeeping.

<sup>36</sup> Grigg (2005): Triple Entry Accounting.

<sup>37</sup> Snow, Deery, Lu, Johnston, Kirby (2014): Factom.

<sup>38</sup> See Chapter 7. Legal and Regulation.

<sup>39</sup> Massa, Vermaelen, Xu (2013): Rights offerings, trading, and regulation: A global perspective.

sive costs for legal consulting and the needed registrations. Furthermore, the official ownership of the project company can't yet be recorded through tokens on a public blockchain and there is a discrepancy between the owner of the corporation and the token holders. This issue will be resolved once the technology is more widely adopted, and regulation has established clear guidelines.

### 6.1.2 Debt Token

The token might also be structured like a public bond where the investor is repaid in either (i) a form of a coupon or (ii) a corporate buy back strategy.

(i) Before the tokens are issued, a fixed or floating interest rate is agreed upon and coded into a smart contract. When the interest and the capital repayment is due, the corporation sends the needed sum of money to the smart contract which then distributes the funds in proportion to each token holder. In this case, the token does not represent an equity stake in the company, ownership is solely in the hands of the core team. Thus, if the company goes bankrupt and is unable to pay back the capital plus interest, the token loses its value. The interest payment can either be done in a base currency like Bitcoin or Ether or in the corporate tokens themselves, depending on market demand. Interest payments have the same issue as dividends regarding custodial exchanges and lost private keys.

(ii) A portion of the funds raised during the ICO and a portion of the cashflow will be kept in reserve to buy back tokens at a fixed or at the current market price. If the price paid for the buy backs is below the highest independent bid, the market price will be stabilized. The market supply will decrease and if demand is constant, the price of the token will increase. The price appreciation will reward investors when they sell their tokens. If the tokens are burned,<sup>40</sup> the supply will be diminished, however, if the bought back tokens are kept in reserve, they can be resold if the company needs additional funding for a future project. In this case, the tokens should be kept in a time locked multi signature account to ensure investors, that the tokens are not dumped on the market. A buyback strategy also solves the problems with custodial accounts and lost private keys, because

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<sup>40</sup> Iain Stewart (2014): Proof of burn

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investors must become active and sell the tokens on their own accord. Furthermore, contrary to dividend or interest payments, a token that relies on a buy back strategy might not be deemed a security, thus decreasing the regulatory burden.

### 6.1.3 Use Case Token

The token use case depends on the underlying project and should further increase demand and liquidity of the token. Not all those use cases of tokens on a digital platform can be adopted to represent physical objects in Project Finance. The token might represent (i) services or products; (ii) a discount; (iii) ownership; or (iv) voting rights.

(i) The token can represent the right to receive a service or product from the venture as soon as it is operational. The Ethereum project created Ether for their ICO, which could be later exchanged for Gas to pay for the computer power to run decentralized applications. Similar, a project might pre-sell the tokens which represent a right to use the services or products from the built project. In an infrastructure project, the token could represent the toll for using the road; in an electric power plant, it could represent the produced electricity; in a real estate venture the right to rent an apartment.

(ii) When the token is exchanged for a service or product, the customer can receive a discount on the price compared to the base currency. The customer has the decision between paying conveniently with the base currency, or to exchange base currency for the token and receive the discount rate. Furthermore, if the customer wants to be support the venture, he can buy the tokens early on, hold and use them to receive the regular discount rate plus profits if the token increases in value. A customer can thus use the token both as an investor and stakeholder in the company, or use it only as a means of payment, not as a store of value.

(iii) The token can represent ownership in the venture, like a publicly traded equity stock, or ownership of specific parts of the venture. In a PV plant, a token might represent ownership of a specific panel or a portion of the entire park, but it is rather complicated to provide access to the specific panel for each token holder, and there might be a run on the panels.

(iv) As stated in the equity token chapter, a complex voting mechanism is not yet technically feasible and the token holder are in several different interest groups, which could

lead to infighting and a halt in the management process. Nevertheless, the incentives for each interest group can be aligned to bring diversity to the management process, where all the parties can express their concerns. Furthermore, having a voting right increases the value proposition for the token, which again increases demand.

Each token can be structured and combined to fit the specific use case of the project and the above list is not exhaustive. Even a token that only has sentimental value has a specific utility, which can be valuable to a certain group of token holders.

In general, the more use cases a token has, the higher the overall value and demand for the token and the less likely it is to be considered a security.

## **6.2 Case Study – Possible Token Structure for PV project**

Renewable Energy Tokens [RET] are ERC20 standard tokens that run on top of the Ethereum Network, they are capped at a fixed amount and highly divisible. RET can be transferred between accounts at minimal cost and they will be listed on several global cryptocurrency exchanges.

RET are sold during the ICO to the local electricity consumer and global investors to raise funds to build PV plants. The electricity produced is sold to the consumers and excess electricity will be provided to the main grid for the local feed in tariff [FIT]. The consumers can pay for the electricity in Euro, but they can also pay with RET valued at the current market price, and receive a discount on the electricity bill [If the current market price is €10; the electricity bill is €500; and RET discount is 10%: the consumer can pay with 45 RET]. The PV company immediately sells the RET at the current market price for the base currency [Euro] and pays for all expenditures without price volatility risk. A certain percentage of profit is dedicated to a buy back strategy for RET and those tokens will be definitively burned. The left-over profit will be used to finance additional PV projects.

The buy-back burning strategy [BBBS] will effectively decrease the supply of RET over time. Demand for RET will be driven by the incentive for consumers to pay for the electricity with RET and once new projects are built, demand might increase further. This leads theoretically to an increasing price for RET.

The frequent BBBS gives short term traders sufficient liquidity and the increasing price rewards long term holders [including the management team]. The discount rate and increasing price rewards consumers that hold and pay with RET. The EBITDA is thus distributed to all stakeholders.

The amount used in the BBBS depends on the future strategy for the project. If only one project is financed, all the EBITDA can be used for buyback. This will deplete the supply rapidly, but demand should stay steady because no additional consumers enter the market.

On the other hand, if the company wants to expand and build further projects, only a certain amount X of the EBITDA is used for the BBBS and a certain amount Y is accumulated to fund subsequent projects. X and Y can be set at a fixed amount before the ICO or set variably depending on the current stage of the project. The decision can either be reached by the management team, or through a vote of all the token holders. For example, at the end of each month, total EBITDA is calculated and consensus about the amount of X and Y is reached. Amount X is then used in the following month to buy RET at a spread-out schedule<sup>41</sup> to manage a steady price and provide liquidity to the market. The higher X, the more supply will decrease; and the higher Y, the stronger demand will grow.

### **6.2.1 Scenario 1: Decreasing market price of RET**

If price drops drastically, it is because demand is decreasing and/or supply is increasing. Demand can decrease when consumers stop paying with RET; investors lose faith in the venture; or the BBBS is reduced. Demand can be increased by granting a higher discount for consumers and by reorganizing the venture to regain a positive evaluation of investors. Supply increases when investors sell their tokens because they predict that the benchmark outperforms the tokens; consumers sell their tokens on the open market with a loss of the discount; or the BBBS is reduced. Thus, supply can be decreased by granting a higher discount for the consumers and increasing the long-term valuation of the venture. The price should theoretically increase, if the discount rate is increased and faith in the

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<sup>41</sup> Daily or weekly for the cost average effect.

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venture is restored. Token holder always have to decide whether they should buy, hold or sell their tokens.

#### 6.2.1.1 Affects for investors

The low price will of course be bad for investors who speculated that the price would increase. If their long-term prediction of the venture is still positive, they might rebuy the underpriced token, but if they predict a failure of the venture, they might exit the market and sell their RET. Investors can also hold the tokens and choose when to exit the market and realize the gain or losses.

#### 6.2.1.2 Affects for consumers who are investors

Consumers who are also investors are affected by the lower price, but they receive the discount rate which increases their profitability compared to investors who are no consumers. They might consider buying fresh RET tokens at the current low market price to pay for their bill to not realize the loses on their holdings in RET. The token holder can choose to rebuy, hold or sell RET.

#### 6.2.1.3 Affects for consumers who are not investors

Consumers who want to get the discount rate but don't want to hold RET can use the token only as a means of payment but not as a store of value. They buy the exact number of tokens needed to pay the bill at the current market price with their base currency and immediately settle their bill with RET. If the price goes down, they receive more tokens in exchange for their base currency, thus non-investor consumers are not affected by a decreasing price.

#### 6.2.1.4 Affects for the company

The company immediately sells most of the RET received in payments to repay the debt and O&M efforts in base currency. This portion of the cashflow is thus not affected by the decreasing price. Nevertheless, the company and foundation will have some RET reserve for community payments, market making and voting rights and those holdings will depreciate. If the company predicts a higher price in the future, they might buy undervalued tokens with base currency to further increase demand. The company has some measures

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to potentially increase the price, mainly a higher discount rate and BBBS, but also better management in general.

## **6.2.2 Scenario 2: Increasing market price for RET**

Market price increases when demand increases and/or supply decreases. Demand can increase, when more consumers enter the marketplace (i.e. when additional parks are integrated in the venture); investors see potential for price increase in the tokens value (i.e. the company is performing well); and when more money is allocated to the BBBS. Supply decreases, when investors have positive price evaluation and the BBBS is increased.

### **6.2.2.1 Affects for investors**

When the token price increases, investors that speculated on increasing prices can sell their RET with a profit and realize the gains. Investors who hold their RET only have a theoretical profit, which is realized once the tokens are sold.

### **6.2.2.2 Affects for consumers who are investors**

The RET that consumer investors bought is now valued higher and an electricity bill in base currency can now be paid for with less tokens. This effectively increases the discount rate for paying with RET.

### **6.2.2.3 Affects for consumers who are not investors**

Because RET is only used as a means of payment and not as a store of value, the non-investor consumers are not affected by the increasing price. They now must buy less RET to settle their bill, which decreases the demand for RET.

### **6.2.2.4 Affects for the company**

The cash flow of the company is denominated in base currency and is not affected by the increasing price. The company's holdings in RET increase in value though. The company has now more money to construct more PV plants which further increase the value proposition of the venture.

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## 7 Legal and Regulatory

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The best approach to regulate this new technology is not yet clear because this is such a fast-moving innovative field and the current regulatory framework is outdated and can't be applied to ICOs.<sup>42</sup> Blockchain companies don't want a complete unregulated market, but regulations that works for global, open, decentralized and censorship resistant networks.<sup>43</sup> This regulation will likely come from solid self-governance that good actors want to implement on their own accord.

The company must thus implement industry best practice, like using a token standard; setting a maximum cap for raising funds; applying security standards, e.g. using a multi-signature escrow time-locked wallet to manage community funds; being open and honest to the community; provide detailed business information and open books. Furthermore, several experts will conduct public due diligence on the projects, further lowering the risk of frauds.

Nevertheless, there are several requirements a company issuing an ICO is currently legally obligated to fulfil. It is in the company's best interest to comply with all the laws to the best of their abilities, and adhere to common decency.

### 7.1 Security Law

If the token represents a security,<sup>44</sup> then the company must register the fundraising with several government agencies, in the jurisdictions of each investor.<sup>45</sup> It is often not clear if a token should be regarded as a security, but in general, a non-security token can have the following rights:<sup>46</sup>

1. Rights to use the system and its outputs;
2. Rights to contribute labor to the system;
3. Rights to program and develop additional features in the system;
4. Rights to mine;
5. Rights to access or license the system and charge a fee for such;
6. Rights to sell products of the system; and

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<sup>42</sup> De Filippi (2014): Bitcoin – a regulatory nightmare to a libertarian dream; in Internet Policy Review, 3(2)

<sup>43</sup> Brito, Castillo, Shadab (2014): Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling; in The Columbia Science & Technology Law Review, Vol. XVI, Fall 2014

<sup>44</sup> SEC v. W. J. Howey Co., 328 U.S. 293 (1946)

<sup>45</sup> See Blockchain Capital Investment Fund 3

<sup>46</sup> Coinbase, Debevoise & Plimpton (2016): Security Law Analysis of Blockchain Tokens

7. Rights to vote on changing the functionality of the system.

In general, a token with the following properties should constitute a security:

1. Ownership of a legal entity;
2. Equity interest;
3. Share of profits/losses, or assets/liabilities
4. Status as a creditor or lender; and
5. Claim in bankruptcy as equity holder or creditor.

Whether the token is deemed a security or not, depends on the token structure, the incentives and use cases. This must be evaluated for each token independently.

If the token will be regarded as a security, then it has to be registered and licensed by the according government bureaus of all the jurisdictions of each contributor. There is no clear standard how a token can be registered, each country or even each state has their own procedures.

## **7.2 Know your Client and Anti Money Laundering**

Anti money laundering and know you client are two important legal aspects of every ICO, but the degree to which KYC must be collected depends on the token structure. If the token is deemed a security, very strong KYC rules may apply, e.g. government issued ID and a utility bill. However, if the token is not a security, only a minimum KYC must be done, e.g. address and telephone number.

This becomes difficult, when investors without access to government issued IDs want to take part in the ICO. Furthermore, token holders can prove ownership of the token without having to provide an identity - this is a core design feature in the Bitcoin network. There is no inherent need to collect identity information of all the investors. If for example the token is issued on the Ethereum blockchain and contributor pay in Ether, than a smart contract can issue the according amount of tokens without any need to confirm identity of the contributor.

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## 8 Currency

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The company deals in several different currencies:

- (a) The currency that was used by contributors during the ICO, this will be the currency of the protocol that is used to manage the tokens (Ether on the Ethereum Network) and other currencies that contributors used as a means of payment.
- (b) The currency that is used to pay for construction, operation and maintenance of the project. This currency will likely be Fiat and is used to pay for taxes and receive subsidies.
- (c) The tokens that are created for the project are used by consumers who pay for the product and by the company to hold reserves and pay employees.

Bitcoin and other crypto currencies are inherently volatile. However, as we see in the chart,<sup>47</sup> the price volatility of bitcoin has been declining as the market capitalization increases. This is because of increased liquidity, a more decentralized network, and further security measures.

Although the volatility might be reduced over time, it is still too high to hedge a long-term business plan with that exchange risk. There are several solutions for this problem.

- (i) The amount raised in the ICO can be denominated in the desired Fiat currency, Euro for example. Some platforms like BitShares<sup>48</sup> have crypto assets that are pegged to different assets, including Euro (BitEUR) and USD (BitsUSD).
- (ii) Once the ICO is complete, there should always be enough base currency in reserve to pay for construction, operation, maintenance and debt repayment. The entire portfolio should be well diversified to hedge against volatility.
- (iii) Each transactions of the company can now be paid in either the own token, crypto-currency or Fiat currency. The company predicts what currency will outperform the others, and hold, buy or spent the currencies accordingly. The most stable currency should be used as the unit of account.
- (iv) There are some short-term options and swaps available on several different platforms, but hedging against currency volatility in the long run will be expensive and not feasible.

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<sup>47</sup> See illustration 2: Price Volatility BTC/USD

<sup>48</sup> Hoskinson, Larimer, Larimer (2014): BitShares – A Peer-to-Peer Polymorphic Digital Asset Exchange

## 9 Conclusion

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Initial coin offerings have revolutionized how organizations can finance a project at an early stage. The company can sell tokens instead of equity, so that the owners don't lose control over their venture. A token can be created and sold globally at barely any cost and even small contributions can be accepted. Investors gain the rights that are encoded into the token and can trade it on a very liquid market, thus if the token gains in value, they can sell it at a profit.

ICOs have previously been used by digital blockchain companies, but they can also be conducted in Project Finance. It is important that the token has a sufficient use case or utility to create demand. This paper introduced a buy-back-burning-strategy to lower supply of tokens and distribute the profit of the venture to all token holders. Theoretically, if the token is demanded and supply is decreased, the price should increase.

However, there are several legal uncertainties regarding ICOs because they are such a new technology and most regulators have not yet given an official statement. Currently, if the token represents a security, then the different security regulations in the jurisdictions of all investors have to be fulfilled, which is a costly task. Furthermore, in most countries, investors have to identify themselves, thus thorough KYC should be conducted.

This paper is only an introduction to this complex topic and further research is needed.

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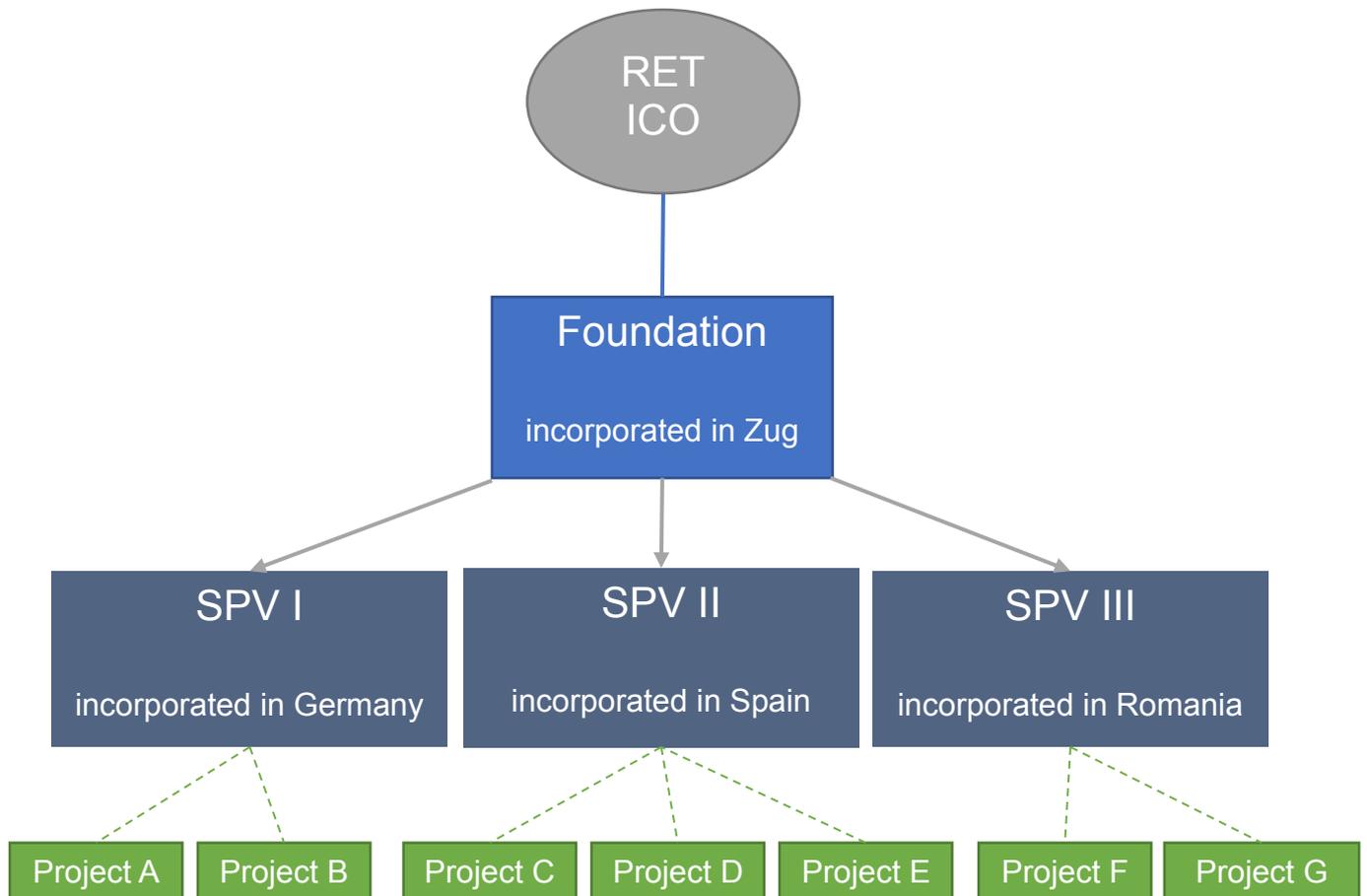
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# Appendix

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## 1. Incorporation Illustration



## 2. Price Volatility BTC/USD



Illustration 2: Bitcoin Price and 30-Day BTC/USD Volatility

Source: [www.buybitcoinworldwide.com/volatility-index/](http://www.buybitcoinworldwide.com/volatility-index/) 20. September 2017