
Whitepaper

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List of Abbreviations

AI: Artificial Intelligence

CAD: Consumer Access Device

DER: Distributed Energy Resources

DR: Demand Response

DSO: Distribution System Operator

DNO: Distribution Network Operator

EV: Electrical Vehicles

IoT: Internet of Things

ITO: Initial Token Offering

NILM: non-intrusive load monitoring

P2P: peer-to-peer

TOU: Time-Of-Use

HH: Home Hub

TP: Trading Platform

V2G: Vehicle-to-Grid

Preface

Following the successful launch of the Home Hub (HH), we plan to extend its functionality through the rollout of the Trading Platform (TP), a blockchain-powered energy trading platform that would be built to enable households and energy consumers to trade electricity in a P2P exchange.

This whitepaper has three main objectives:

1. Show the need for change in the energy sector
2. Demonstrate why a P2P blockchain-powered platform is the right solution to the problem
3. Outline eSource's plans for making the TP platform a reality

The platform is a work in progress. This whitepaper represents eSource current thinking on how the technology should be used and deployed. Technical and theoretical developments in the blockchain community are occurring at rapid pace, and eSource intends to incorporate new ideas and thinking as they emerge, should they support the overall objectives and goals of our platform.

Section 1, we provide an overview of the energy industry, and introduce the HH, a non-intrusive load monitoring (NILM) device that samples electricity data. This paper demonstrates why eSource believes through existing hardware, ultra-high resolution energy data, deep learning, and AI capabilities, it can uniquely position itself to provide an industry-leading energy trading platform.

Section 2 explains how key industry challenges (increasing renewables installation, population, and electrification of heat and transport) would placing greater strain on the electricity grid, and why eSource thinks a P2P energy trading solution will create an efficient market framework that empowers consumers to respond to energy infrastructure requirements (for example, by installing PV panels, batteries or providing demand response capacity).

Section 3, illustrate how a P2P based sharing economy has opened up new opportunities in other industries, and show that with recent cutting-edge technological advances (blockchain, IoT, AI), we think a sharing economy for the energy industry is a viable reality.

Sections 4 and 5 provide a technical overview of the TP system, followed by our proposed economic model. We discuss how the blockchain trading system works, and how we expect key stakeholders will benefit from the platform. Our long-term vision will be to provide a global energy trading platform.

1 - *eSource*

1.1 Background

Electricity is a critical form of energy, powering our electronic devices, lighting, heating and cooling systems, household appliances, and the Internet. Most of us cannot imagine a day without electricity – and when blackouts occur, our economy, society, and public infrastructure grind to a halt.

Yet, though many of us take our electricity supply for granted, there are significant problems that eSource thinks needs to be addressed.

The majority of our electricity is generated by dirty, inefficient, and expensive energy systems, causing health problems and exacerbating climate change.

Across the world, the present industrial structure is formed largely by vertically-integrated utility companies and network operators. With energy systems centrally controlled, these power utilities have a strong influence over how, where, and at what cost electricity enters our homes and businesses alike.

However, with increasing penetration of micro scale renewables, growing public pressure around climate change, and advances in digital and communication technologies, eSource thinks the democratisation of our power systems is rapidly becoming viable.

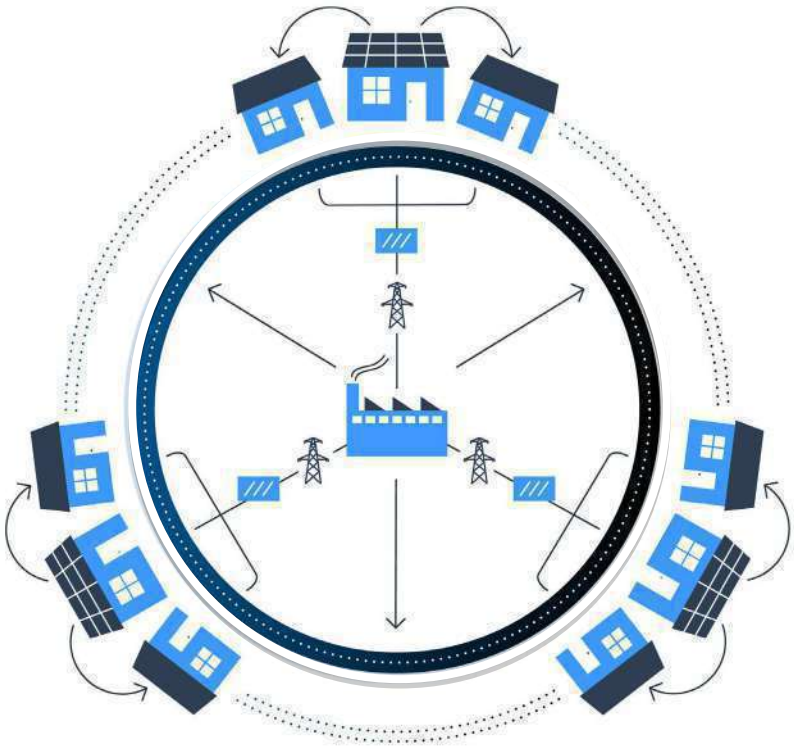
eSource thinks a transition to an empowered and sustainable energy future can be accelerated by focusing on four critical factors at the network edge:

1) Access to data; in particular, understanding the drivers of electrical demand

2) Provision for domestic energy storage

3) Maintaining compatibility with grid incumbents

4) Automated and secure trading of energy at the network edge via a traceable medium, blockchain.

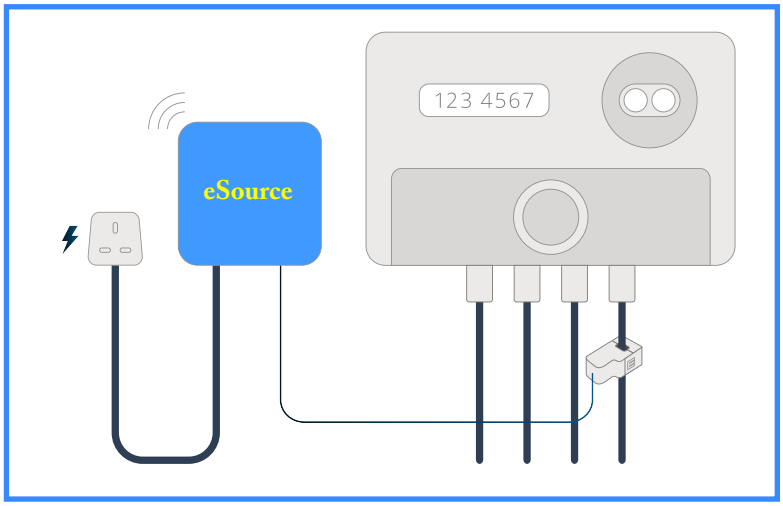


eSiurce thinks a P2P trading platform provides the most effective and future-proof way to democratise our energy system: by empowering households to sell their excess energy from solar PV or home batteries in an open marketplace. The correct market incentives can be put in place to support a long-term energy infrastructure dawn. The proposed Trading Platform (TP) provides a blockchain-powered solution where energy can be traded with low transaction costs. As the percentage of intermittent renewable energy increases to meet our carbon targets, eSource thinks that reducing transaction costs is essential to support the grid-edge trading needed to balance demand against supply.

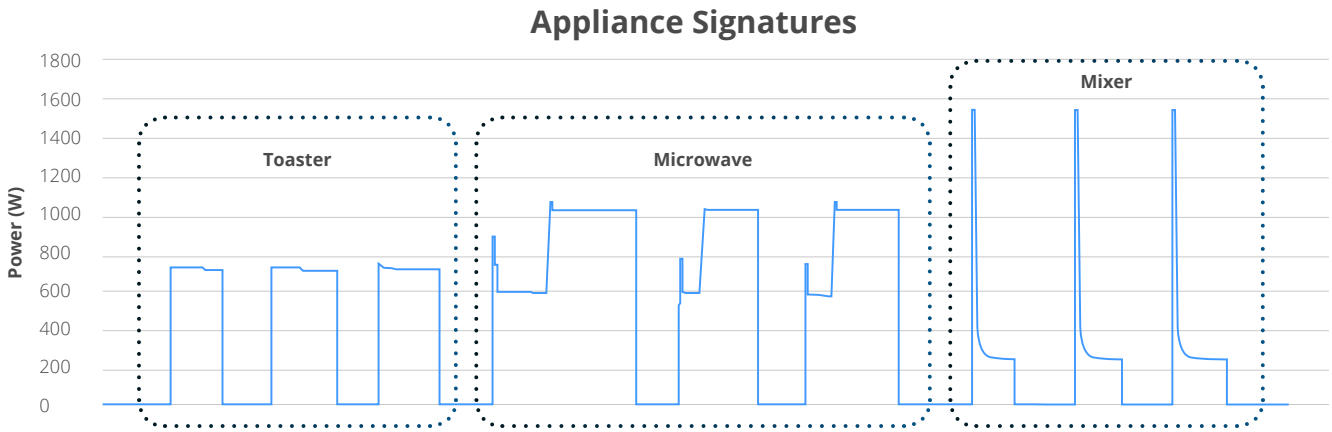
eSource thinks the Home Hub (HH) and TP present a powerful solution to enable decentralised control and production of energy at the grid edge. The device combines ultra-high resolution electricity sampling capabilities, with an ability to be upgraded to enable P2P energy trading platform. Combined with technology for appliance use disaggregation, eSource thinks the TP can provide the most competitive and advanced technological offering for a decentralised energy trading solution.

1.2 Introducing *eSource*

eSource's core product initiative is a patented (HH), self-install energy hub that samples a home's energy consumption approximately 5 million times faster than a smart meter.



By using AI algorithms to derive a real-time profile for key household appliances – providing homeowners with a view of their energy appliances' current status (i.e. ON/OFF) and condition (e.g. operating at 95% efficiency).



The HH with a Consumer Access Device (CAD) can connect to the cloud via Wi-Fi network and provide users with a central hub for controlling other cloud-connected smart appliances. eSource's vision is to build considerable market traction, with HHs already available for organisations / users seeking:

- A breakdown of their individual appliance costs, their deviation to the average, and ROI calculations to recommend upgrades to the latest eco products
- Predictive maintenance alerts for key appliances (i.e. letting you know your fridge is about to break down before it does)
- Control and communication with smart appliances and smart home products

The HH incorporates a chip which will enable it to function as a consumer access device (CAD). This CAD has also been designed to connect directly with smart meters for eSource to be able to control and monitor tariffs on behalf of the consumer. CADs are newly-mandated household devices showing actual tariff rates in cost / kWh from smart meters. Combined with consumption pattern data and P2P energy trading, the HH is expected to enable each household to procure electricity from the cheapest energy provider.

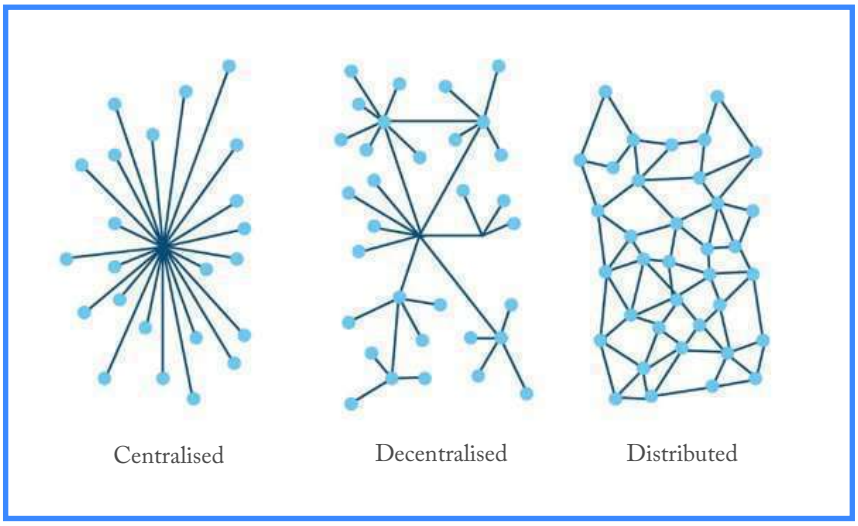


figure 1-1. The three different types of software applications

The system would be designed so all owners of the HH can receive a remote firmware upgrade that enables them to start trading on the TP system.

Active selling of HHs is an important precursor to eSource's energy trading platform: it provides early adopter feedback, and improves the AI algorithm through collecting multiple household usage datasets.

The map shows the expected compatibility of the unit globally. Countries shaded in dark blue should in most cases be compatible with the HH, requiring only a plug change for the mains socket where applicable.

The HH's advanced disaggregation ability combined with AI enable the creation of accurate consumption forecasts generated in real-time. eSource thinks these demand forecasts play a critical part in ensuring a smooth transition to decentralised energy systems. eSource believes existing technology and capabilities in energy data monitoring and analytics provides an unparalleled advantage over current competitors. Where a number of competitor offerings rely on smart meter data to track electricity flows, eSource's technology proposes ultra-high resolution readings that enable disaggregation of electricity readings, and identification of key electrical appliances in the household.

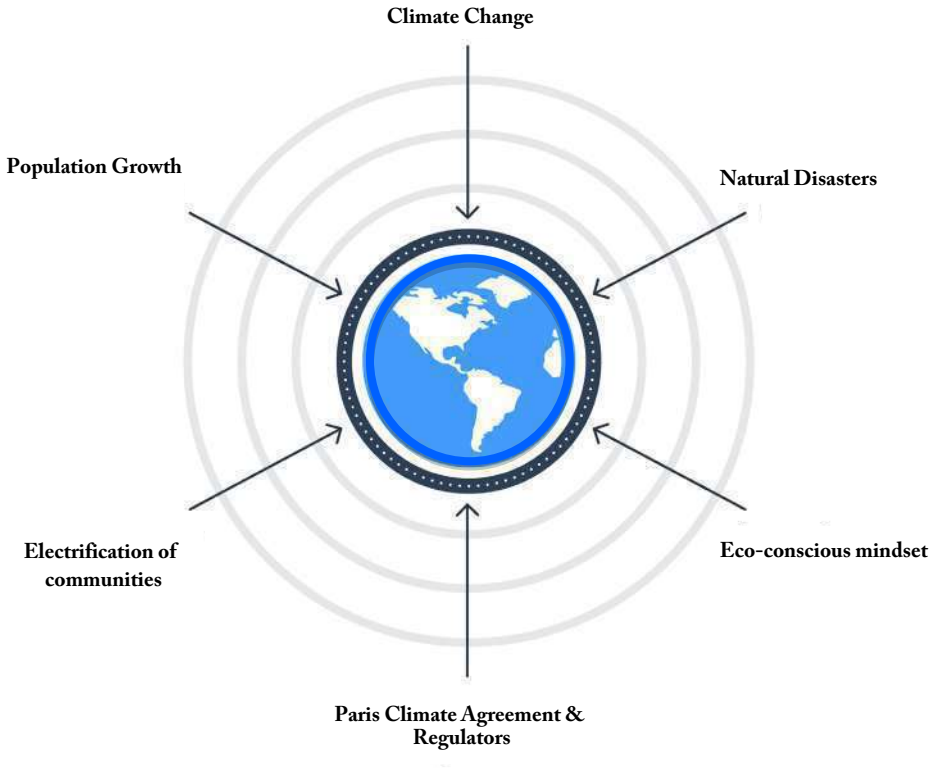
To provide a comparison with the retail industry, the difference is between knowing the total value of customer spend, and having detailed, line-item transaction data for each customer. We believe the former enables rough prediction of how much a customer might spend in the future; and that the latter enables more powerful and accurate predictions that take into account customer purchasing habits, behaviour traits, exogenous factors (e.g. weather, special events), and clustering of customer preferences and tastes.[6]

For example, smart meters would be able to tell 1.5 kWh of energy was used between 12:30pm and 1pm; whereas eSource proposed designed would be able to tell whether it was a kettle and a washing machine, or a dishwasher and hair straighteners, as well as how long they were switched on for. With more detailed knowledge of user behaviour, eSource should be able to make better predictions for optimised energy trading decisions.

2 - Industry Overview & Market Trends

Over the coming decades, energy systems around the world will face significant challenges from increasing energy demand, changing sources of generation, ageing infrastructure, and disruptive technologies.

Climate change has been recognised as a global threat, and concerted action to reduce greenhouse gas emissions has led to significant technological developments in renewable technology, electric vehicles (EVs) and electricity storage. The Paris Agreement commits 194 countries to dramatically reduce their carbon emissions, and the impact of climate change mitigation is expected to have profound consequences on energy systems across the world.



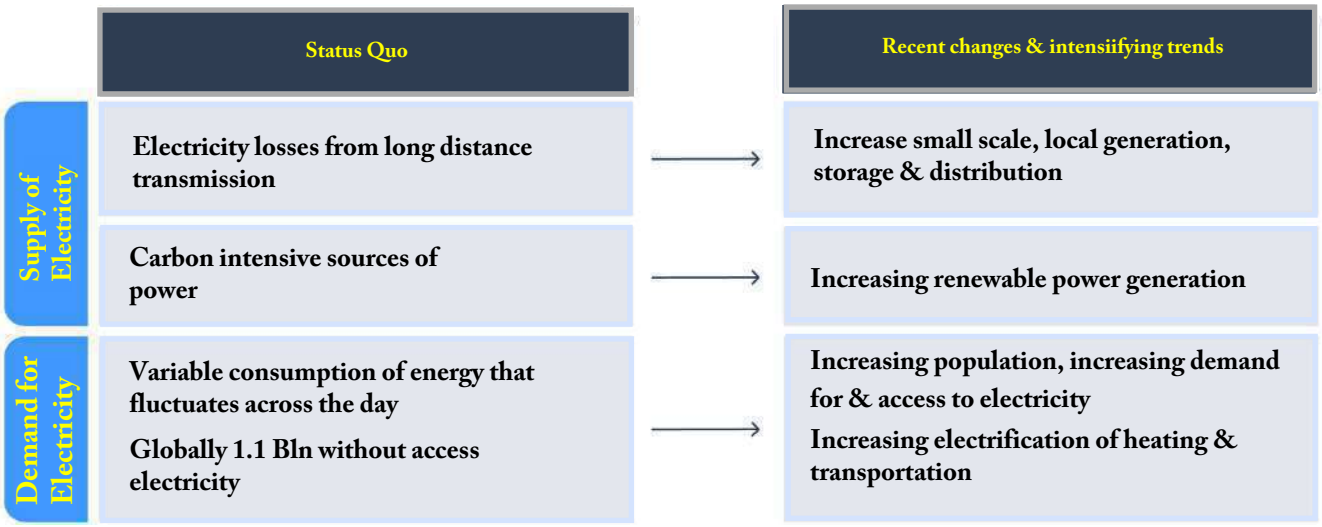
For example, global leaders are actively seeking solutions to the widespread adoption of EVs and electric heat sources, as these will cause significant demand balancing and transmission challenges at critical points throughout the day. Supply is shifting towards a growing base of intermittent renewable power that cannot be switched ON/OFF to meet demand.

Left unaddressed, eSource thinks the increased strain on our energy grid could result in more power outages, higher bills, or both. At the same time, the economic and social cost of just a few seconds power outage is increasing, with an expected growing multiplier effect of negative consequences.

eSource thinks a sustainable, reliable, and resilient energy system is critical to the success of any society and economy , particularly as we grow increasingly reliant on technology and our smart devices. Under this lens, changes in demand and supply of energy could present a significant challenge for the future, as well as a potentially valuable opportunity to upgrade our electricity grid for the 21st century. Governments around the world have acknowledged the need for investment and development of a smart and flexible grid.

eSource thinks the future grid should:

- Support the transition towards a smarter, more sustainable and flexible energy system
- Empower consumers to take control of their energy suppliers
- Encourage technologies that allow consumers to generate, store and trade their own electricity in a cost-effective and affordable way
- Provide opportunities for entrepreneurship and innovation



2.1 Generation

Today, power generation is a centralised, carbon-intensive process. Large power plants are required to generate electricity by burning coal and gas in some instances to meet demand. Scale is critical: larger power plants could be more efficient, so power generation is predominantly centralised by a large utility company who distributes to the retail outlets, that distribute to the end users. While such generation has the advantage of allowing supply to follow demand, eSource thinks such energy generation technologies are unsustainable in the long-term, which is leading to an increased focus on alternative renewable generation technologies.

Increasing Renewable Generation

Technological developments in renewable energy (in particular, solar and wind power) have accelerated rapidly to address the growing need for a clean and sustainable source of energy. Globally, micro renewables and distributed energy resources (DER) continue to fall in price, reaching price parity with fossil-fuel energy, and making their widespread adoption accessible to the mass consumer market. For example, rooftop solar in the US is now cost competitive with most utility prices, which has resulted in micro generation communities emerging across the country, from New York to California. In Spain, renewable energy capacity accounted for more than 45% of total national installed capacity by 2016.

These changes have led to a growing body of **prosumers**: households and small businesses, traditionally consumers of electricity, who are now producing energy. Excess energy that has not been used by the owners can be fed back to the grid and used by other households. For a typical household with solar panels, 20-40% of energy generated is not used by the prosumers, providing a growing source of grid capacity. While this generation is low carbon, it is intermittent, requiring demand to follow supply. This then requires higher levels of sensing, storage, and control to support successful grid integration.

2.2 Transmission

Energy Losses Through Transmission

Existing transmission infrastructure was built to connect large power stations with households across the country. These large power stations were typically built in remote locations far from densely populated areas as they were dirty (coal) or potentially dangerous (nuclear), posing dangers to human health. Others were situated close to fuel sources (e.g. coal mines) to minimise cost of fuel transportation.

However, electricity transmitted across these distances results in energy losses and greater cost to the consumer. According to the International Electrotechnical Commission (IEC), losses from centralised generators to the consumer ranged between 8-15% because of the 'joule effect', where energy is lost as heat in transmission through cables and substation transformers.

Local generation of renewable power can reduce wasted energy, as electricity needs to be transmitted only a short distance before use, reducing the overall cost and increasing the efficiency of the energy system.

The Potential for Blackouts

Further, the existing electricity grid infrastructure relies on long power cables running across the country, which are vulnerable to disruption from falling trees or adverse weather conditions. One collapsed power line can cause disruption for thousands, and restoration of power can take days. A natural disaster that brings down power lines can disrupt power supplies for thousands of households, lasting days or weeks (see box).

A local, more decentralised energy system could provide an alternative source of electricity during a centralised power outage and could limit the impact of blackouts. Households looking for a more robust and resilient energy supply have already been adopting microgeneration solutions to provide backup power during central power outages.

Estimates show that short blackouts cost the US approximately $110 billion every year.

To highlight just three natural disasters in 2017/8:

- Storm Eleanor caused power outages to over 75,000 homes in the UK and Ireland;
- Storm Irma resulted in blackouts for over 6 million homes in the USA, some left without power for over a week;
- Hurricane Maria left parts of Puerto Rico without power for more than 4 months.

2.3 Energy Consumption

Despite efforts to reduce energy consumption and improve energy efficiency, a growing population and the electrification of transport and heating is expected to increase demand for energy through to 2050. Total domestic annual electricity consumption is estimated to increase from 112 TWh today to 132 TWh in 2050, with peak electricity consumption anticipated to increase from 65 GW today to 85 GW by 2050. Global electricity consumption is set to double in the next 40 years.

Population growth

A growing population base should result in higher energy demand. In the Africa, the population is predicted to increase by 1.3bn by 2050. Globally, population is forecast to grow by 2bn people to 9.8bn in 2050. Importantly, access to energy is also expected to increase: where 1.1bn are currently without access to electricity, forecasts expect that figure to drop to 400m by 2050.

Electrification of Transportation

By the end of 2018, the cost of owning an electric vehicle (EV) is forecast to reach parity with combustion engines. With driving range extending and charging infrastructure booming, estimates indicate that by 2025, one in six cars purchased will be an EV, building from an existing two million EVs on the road globally. While a growing fleet of EVs will add to demand for energy, they also present opportunities for providing balancing services. All EVs have a battery which should be capable of removing or providing energy to and from the grid, according to demand and supply needs at that time.

Electrification of Heating

To meet climate change goals, industry experts believe gas-powered heating systems will need to be electrified before they can be decarbonised. In the UK, for example, National Grid have estimated the number of gas boilers will have to reduce from 22 million today to 7 million by 2050. Many of these boilers will have to be replaced with electrically-powered air, water, and ground-source heat pumps which offer significantly improved heating efficiencies. To reduce their carbon impact, they will have to run on renewable electricity.

2.4 Challenges and Opportunities for Tomorrow

eSource thinks the convergence of increased intermittent renewable energy generation and higher energy demand, operating on an ageing transmission and distribution network, poses a challenge for network operators trying to balance supply with demand. The result is a growing operational challenge for electrical power systems, controllers and increasing strain on grid infrastructure. Left unaddressed, expensive infrastructure upgrades will be required, resulting in potentially higher future energy bills.

There have been a number of proposed solutions to the challenges facing the electricity grid: build new coal burning power plants, increasing local generation of renewable power, developing microgrid solutions, increasing demand response (DR) capability.

Of these, eSource thinks P2P energy trading provides the critical service of consolidating these disparate solutions and optimising the economic efficiency of the system. eSource aims to enable participants who develop battery capacity, add microgeneration solutions, or provide DR services to trade their generation and storage capacity on the P2P platform. eSource thinks consumers will be incentivised to use energy at a time that places less strain on the grid, driving a virtuous cycle of additional revenue, engagement and innovation.

Towards a sharing economy and peer-to-peer trading

In recent years, the sharing economy has become the new normal, disrupting many incumbent industries and providing more choice on the market. Where private assets were previously left underutilised, the sharing economy has enabled individuals and households to monetize existing assets, improving resource efficiency, increasing market competition, and providing better outcomes for consumers. AirBnB and Uber have developed global networks of P2P resource sharing, and many others (HiyaCar, JustPark, Lyft) are following quickly behind.

The success of the sharing economy is also due in part to the customer's interest in provenance and understanding the complete supply chain of consumer items. From chocolate and coffee beans to the latest smartphones, consumers want to know their purchases have been sourced from ethical, sustainable and environmentally-friendly origins. Globally, "Buy Local" has become a powerful slogan for small and growing businesses, as customers look to support communities and individuals, rather than corporations.

As the P2P, sharing economy becomes more mainstream, its application to the energy sector has already begun in communities around the world. eSource thinks the potential benefits of innovation are significant. Households can procure their energy from other households with solar power, for lower prices, more sustainable outcomes, and clear knowledge of where their money is going.

The value of this opportunity is clear. In the past 24 months, several companies have announced plans to develop P2P energy trading capabilities. eSource's TP product will build upon their previous proposals – with existing HH hardware, technology, and ultra-high resolution energy data. eSource is hopeful in its ability to provide a more effective and compelling solution, particularly over competitors using smart meter technology. Through a single product, eSource intends to offer a combined value proposition: providing detailed energy disaggregation data, services derived from the data (e.g. fire safety alerts), and energy trading capabilities.

AirBnb for the electricity sector?

AirBnb has enabled owners of prime real estate to earn money from fully utilising their assets – at the same time providing new accommodation options for other consumers.

In the same way, a P2P energy trading solution could create new opportunities for local businesses to grow: owners can install solar panels to generate electricity on underutilised land and building surfaces; and batteries can be installed in unused spaces.

Additional income generated can supplement owners' income, while improving the sustainability of our energy grid. The sharing economy has already generated many new business models, and eSource thinks its application to the energy industry presents an exciting new opportunity.

Features & Trends	Potential effects	Potential impact on the utilities & existing grid	Potential impact on the individual consumer	Potential impact on governments	How eSource believes a P2P energy trading solution would help
Increasing population and increasing electrification	Additional demand on grid infrastructure, adding greater pressure to ageing infrastructure	Requires costly infrastructure upgrades resulting in lower profits and higher cost to customers Traditional utilities are more likely to invest in carbon-based generation technologies – due to existing infrastructure and capabilities	Higher electricity bills	Political unpopularity from high energy costs	Better financial incentives would encourage households and SMEs to invest in generation and storage capability, increasing overall system capacity and efficiency
Existing long-distance transmission networks and an ageing infrastructure	Vulnerable electricity transmission network, risking blackouts if disrupted		Higher electricity bills Risk of blackouts and brownouts disrupting day-to-day life	Political unpopularity from high energy costs Risk of blackouts and brownouts disrupting economy and society	Encourage local generation of electricity: reduce load on long-distance transmission networks and provides local backup for electricity in case of blackout
Carbon-intensive generation technologies	Contributing to climate change and environmental impacts		Higher electricity bills and lack of sustainable energy supply options	Political unpopularity from high energy costs Failure to meet international agreements on climate change action (e.g., COP21 Paris agreement)	The majority of small-scale electricity generation is based on renewable technologies, reducing the carbon intensity of energy generation

3 - A Peer-to-Peer Energy Trading Solution

P2P is not just about social good and sustainability: eSource thinks it also makes economic sense.

In our opinion, P2P energy trading presents an exciting option that enables consumers to benefit from their neighbours' excess energy from microrenewables and/or energy storage. We expect the benefits for both parties entering into an energy trade exchange to be significant.

In the UK, households with solar panels are paid 5.0p / kWh of solar electricity they sell to the grid (an export "feed-in-tariff"). At the same time, their neighbour pays an average 14.3p /kWh to buy electricity from an energy retailer. With P2P trading, they can potentially meet in the middle, e.g. buying and selling for an average of 11p /kWh, including transmission and distribution fees.

Regulations surrounding transmission and distribution fees will vary significantly by country, and eSource is committed to working closely with government bodies and regulators to introduce appropriate fees given the characteristics of the energy trade. While current legislation in most countries does not accommodate the ability to determine transaction fees on a trade-by-trade basis, eSource believes there is appetite in the industry to change current fee structures.

eSource thinks distribution and transmission fees should reflect the actual use of the network: if electricity is traded locally, within a single building, during off-peak hours, charges should reflect the reduced strain placed on the electric grid. eSource expects network operators should be aligned with such goals: encouraging local generation and consumption of electricity during off-peak hours will reduce the load on the network.

In our example, the prosumer potentially receives greater income from their renewable power sources and the consumer potentially pays less for their electricity. Therefore, both parties should benefit financially, and the transactive efficiency should be improved, due to shorter distances from power generation to consumption.

While household solar installation has been growing, eSource thinks the existing pricing system currently creates disincentives for households to install capacity beyond their single household's consumption levels. California Solar Initiative encourages "right sizing" of installed solar capacity, as net metering regulations stipulate self-generated solar power can only be used to offset energy bills, but not generate additional revenue. In the UK, households that sell electricity to the grid are paid 60-70% less than the retail price of electricity, resulting in a typical return on investment (ROI) of 14 years.

Households can also benefit from installing batteries where time-of-use tariffs (ToU) are available. ToU tariffs (where cost of electricity is higher during peak hours, and lower during off-peak hours) are already widely used in California and Hawaii, and are increasingly common in the Europe. With P2P trading, households should be able to charge their battery during off-peak hours, then sell electricity to other households during peak hours. In doing so, they should have the ability to generate revenue, reduce electricity costs for other consumers, and help the grid to balance its supply and demand.

A P2P energy solution is designed to enable consumers to buy electricity from each other, encouraging future investment in small scale renewables and battery storage. eSource thinks this empowers households to take active control of their energy supply, create new business opportunities, and support the transition to a more responsive, flexible, sustainable energy grid.

3.1 Why now?

The advent of the latest Internet Protocol (IPv6) enables an astonishing increase in address space, that can now assign a unique identifier to "everything". Once identified, wireless advancements address this need with different types of networks and specific strengths. Low energy range networks (e.g. Bluetooth) for wearables, very-high speed networks (e.g. 4G LTE) for vehicles, Zigbee and Wi-Fi, similar technologies for smart homes/smart cities. All for free or at a very affordable cost.

Monitoring electricity flows on a second-by-second basis and faster requires inexpensive but powerful senors. We are experiencing a continuous vertical drop in the cost of electronic senors, with their proliferation in devices of any kind. Control of electrical appliances is predominantly manual. Electricity consumption occurs every second of the day for 365 days a year, generating a rich amount of data (thanks to sensors) and receive (thanks to wireless) is strengthening self organized networks.

Ongoing electricity purchases require an extensive number of transactions, for which eSource thinks traditional reconciliation and auditing via intermediaries can be onerous and costly.

However, technological advances in recent times have paved the way to make P2P energy trading a compelling and exciting reality. In particular:

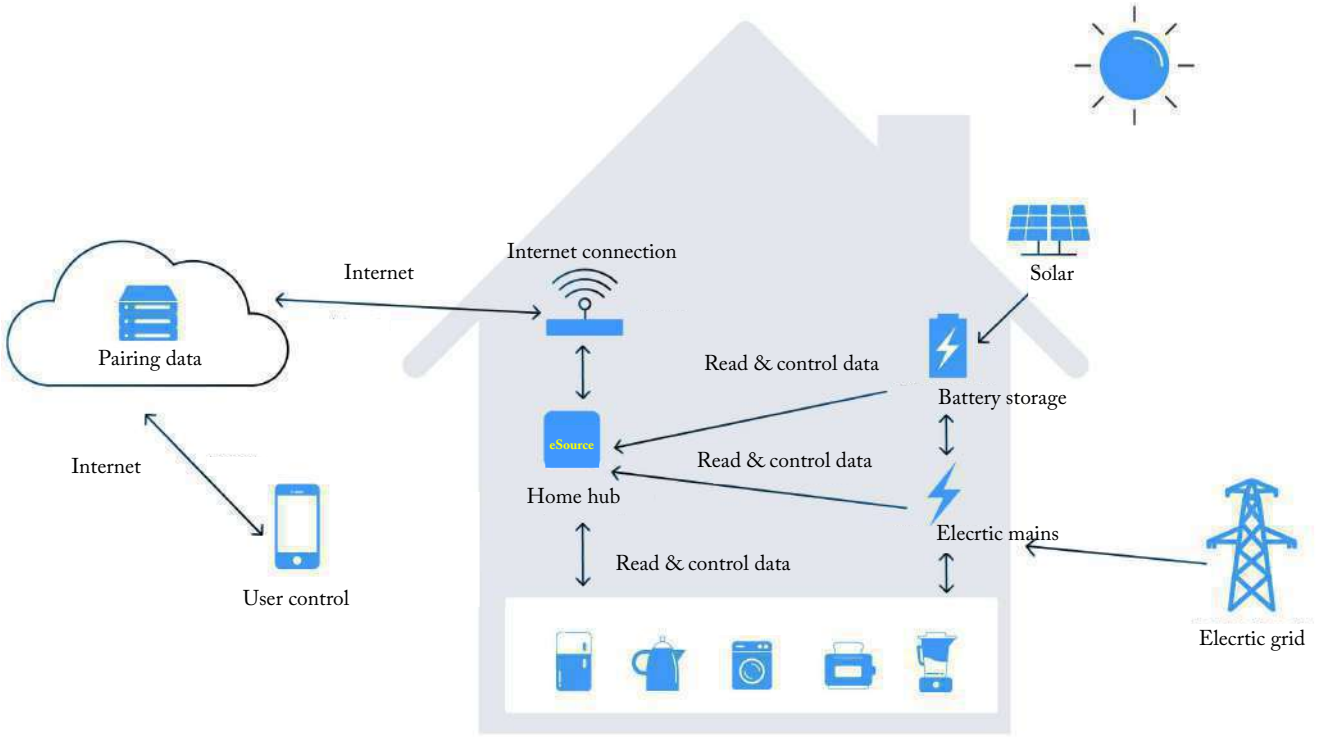
- Digitalisation of the energy industry and continuing advances in IoT and semiconductor technology has made ultra-high resolution non-intrusive load monitoring of electricity an affordable reality
- Developments in blockchain technology have provided a means of digitally tracking and authenticating transactions, removing the need for intermediaries who increase the cost of these transactions
- Advances in deep learning and AI algorithms enable complex analytics on consumption patterns to be generated, enabling accurate predictions of consumption and optimisation of energy trading.

In the following section, we will describe these technological developments in greater detail. eSource thinks each of these technologies has reached a level of sophistication and mainstream adoption that has driven down cost, and improved accessibility and ease of implementation.

While eSource shares some characteristics with other proposed P2P platforms, eSource is focused on differentiating itself through high frequency sampling of electricity and applying deep learning AI via the HH to generate consumption and generation forecasts of an advanced nature, which can optimise the pairing process for energy trades.

3.2 Digitalisation of Energy and IoT

The energy industry has been undergoing a rapid digital transformation. The recent International Energy Agency (IEA) flagship 'Digitalisation and Energy' report noted that: "Investment in digital electricity infrastructure and software grew over 20% annually between 2014 and 2016, overtaking global investment in gas-fired power generation." Widespread installation of measurement instruments (e.g. smart meters, Home Hubs) and cloud-based communication platforms are facilitating a new, smart ecosystem that could provide autonomous, inter-property exchange.



Broadband and 4G (and soon 5G are widely available, the cost of connecting is decreasing, and an increasing number of devices are manufactured with built-in sensors. Application programming interfaces (APIs mean disparate systems can autonomously communicate. For example, Amazon's Echo can be integrated with Hive's Smart Home control systems, so users can ask Amazon's Alexa to switch off the heating, or turn off the lights – without having to go through a Hive interface. These developments provide an opportunity for high resolution data to be recorded in real-time, transferred to the cloud for processing, and the analysis presented to users or automated response systems.

In relation to energy, these technical developments should mean that participants within an IoT network are able to understand (with detailed data and without human intervention) how, where, and why their energy is transacting. Combined with control systems, eSource thinks IoT extends the technical capabilities of domestic energy storage to 1) connect PV arrays to batteries, and 2) communicate when to store / discharge electricity. eSource thinks such control capabilities will enable users to maximise revenue and ensure their storage requirements are met, while optimising battery life and condition.

In parallel, the market for storage technologies has been expanding. In 2016, the market for storage grew by 284%, and is expected to reach an installed capacity of 40 gigawatts by 2022. Combined with falling costs per kWh of capacity (with some companies expecting to achieve $100/kWh in 2019) and battery advancements in density, compactness and safety, the co-location of storage systems is quickly becoming an essential add-on for households installing small-scale renewables.

eSource thinks the HH is the perfect companion to the growing digitalisation of energy, providing industry-leading energy consumption data that is able to inform the monitoring and optimisation of battery usage. For consumers, remote sensing should be able to tell them whether their neighbour's infrastructure has the capacity to supply cheaper electricity; for prosumers, which households have demand for their excess energy.

In combination with its analytical capabilities, the future HH will be designed to communicate directly with smart plugs and smart appliances, enabling households to control their appliances remotely and/or automatically via pre-set machine-to-machine (M2M) controls. This functionality is expected to enable home energy systems to be programmed to switch smart appliances ON/OFF depending on real-time electricity capacity and prices. eSource thinks IoT and AI makes executing P2P energy transactions at the grid edge technically feasible, and an increasingly practical option.

3.3 Blockchain

Presently, financial transactions rely heavily on intermediaries such as banks, who build trust and reliability into the transactional process through authentication and record keeping. Historically, digital transactions for assets (money, stocks, energy) have been particularly reliant on intermediaries as the ability to duplicate digital data (either intentionally or unintentionally), would enable users to spend the same unit of value more than once. In a P2P transaction, without intermediaries accountable for managing the transaction, it would be difficult for the exchanging parties to authenticate the trades. However, eSource believes blockchain solves this problem.

At its essence, blockchain is a distributed ledger or decentralized database that maintains immutable digital records of ownership and transactions. Instead of a central administrator using a relational database, a distributed ledger has a network of replicated ledgers, synchronized via the internet and visible to anyone within the network. Blockchain networks can be private with restricted membership (like an intranet), or public and accessible to any person in the world (like the Internet). As the trading platform is distributed across multiple nodes, blockchain technology ensures integrity and reliability of the ledger without the need for a third-party intermediary.

Considering the number of transactions and participants in a peer-to-peer energy trading system, eSource believes blockchain is integral to the feasibility of the platform through enabling all parties to minimise transaction costs, improving the economics for all involved.

eSource's blockchain platform, which will enable users to trade electricity on the Ethereum platform. The platform would be designed for flexibility, with the intention of allowing additional use cases to be easily incorporated.

3.4 Artificial Intelligence (AI)

Advances in machine learning and AI have over the past few years transformed many industries, improving predictive capabilities and providing better models of human behaviour. For example, the development of complex machine learning algorithms has enabled retailers to predict customer activity, understand trends in consumer purchasing behaviour, and adapt advertisements and content for customers' individual preferences.

eSource believes these advances can be applied to the energy sector, using algorithms to disaggregate electricity data to appliance use information, and providing better predictions of energy use behaviour. Under this lens, eSource believes AI will become a critical enabler for energy trading and the balancing of demand and supply of energy.

Embedded AI has been designed to build on IoT's passive sensing and control functionality, through deriving patterns and relationships from multiple datasets to guide the flow of energy in its most economical and sustainable form. The datasets AI has been designed to draw from include:

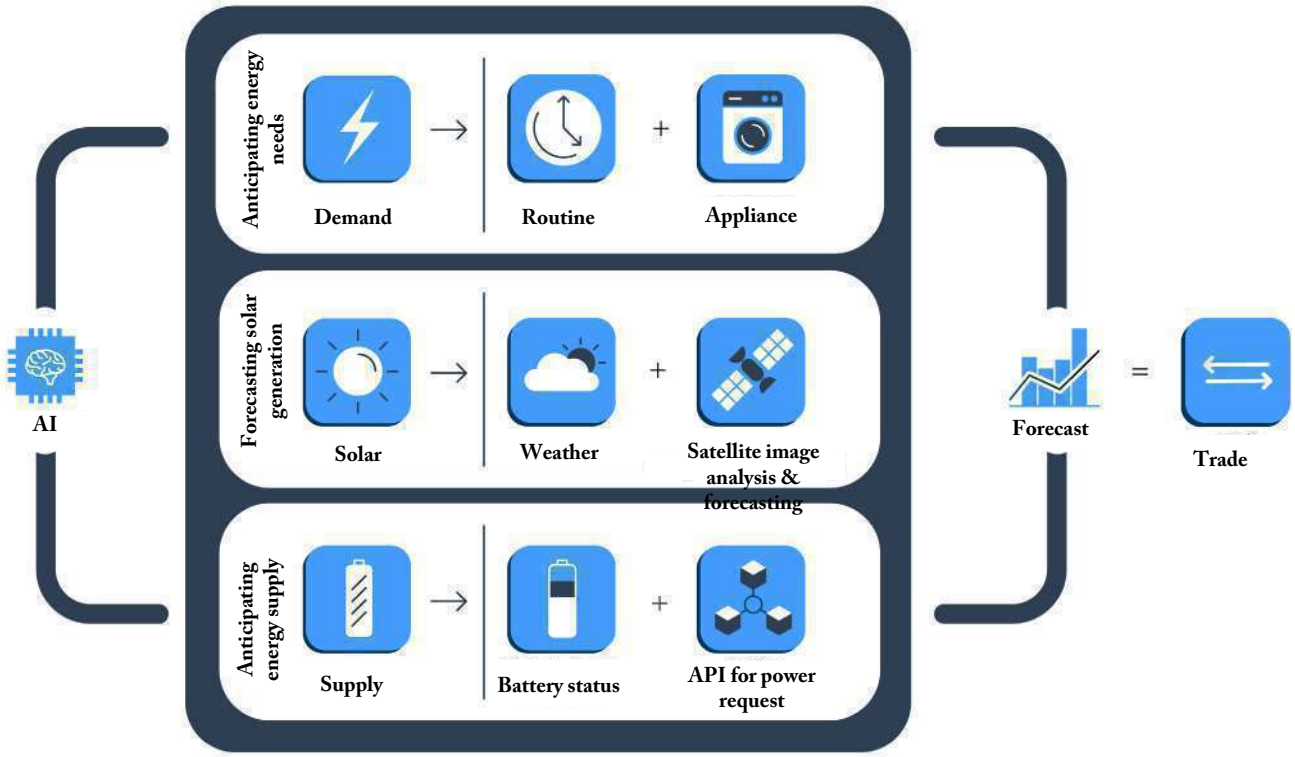
1) Data on household electrical activity, both on i) appliances and ii) microgeneration/storage assets (capacity, performance, state of charge)

2) External factors influencing electricity generation/consumption, specifically weather forecast data, geolocational data, satellite data on cloud coverage and opacity.

Designing the system to process these data feeds with neural networks, which could be trained to identify inter-connected patterns so that forecasts for generation, consumption, and battery activity can be continuously improved. We expects this to result in the efficient utilisation of electrical infrastructure, and therefore provide an assurance that the generated kWhs will be traded at the right time for the best economic return.

To achieve this, the HH would leveraged key developments in AI, particularly deep learning, enabling it to train powerful models of consumption behaviour.

Further, eSource expects the AI algorithms should be able to learn not only customers' energy consumption behaviour, but also their patterns of engagement with energy trading. Rather than requiring ongoing input and decisions from the user, it is anticipated that the algorithms will learn how the user interacts with the platform to provide a customised experience that ensures long-term, sustainable customer engagements.



4 - Introducing *eSource* Blockchain Framework

By combining innovations in AI, blockchain, IoT, and energy storage, eSource hopes to lead the establishment of P2P energy trading in Africa. A TP designed to facilitate trading at the grid edge. Prosumers selling electricity are expected to receive a better payback, incentivising installation of renewable infrastructure and storage; consumers should be able to diversify their energy supply, purchase energy at lower prices, and may also be incentivised to consume energy during off-peak hours, or when renewables generation is high, which in turn should mitigate the variability in peak consumption and renewables generation.

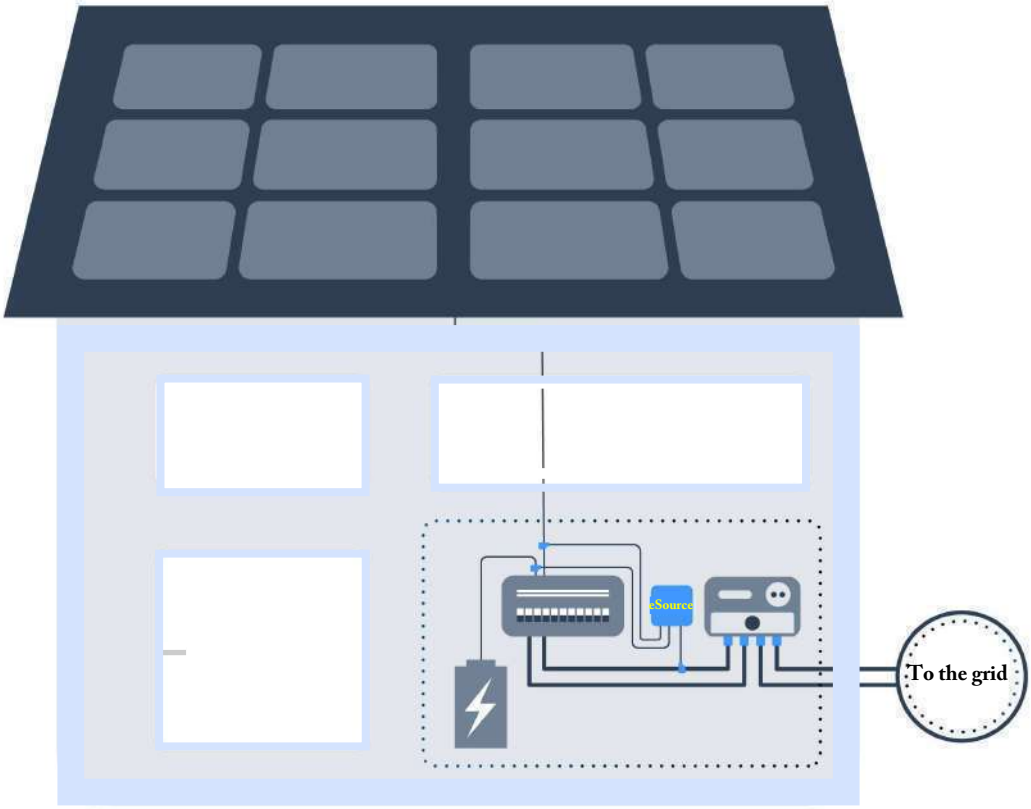
Using proceeds from the Initial Coin Offering (ICO) and the value of aggregated data, eSource aims to fund a model for the TP, providing participants the option of using the TP with no platform cost.

4.1 Getting set-up on the TP Network: a household's point of view

Imagine a street with 10 homes, where only a few houses have solar panels and electric storage.

At certain times of the day:

After taking into account transmission fees, payable to transmission and distribution system operators, there might be additional margin for prosumers to receive a higher rate for their generated electricity, and for consumers to pay less p/kWh. Furthermore, feed-in-tariff rates have been declining globally, which eSource thinks increases the importance of providing households with a P2P trading alternative. Recognising the imbalance and opportunity, this community implements a system for trading this surplus solar energy.

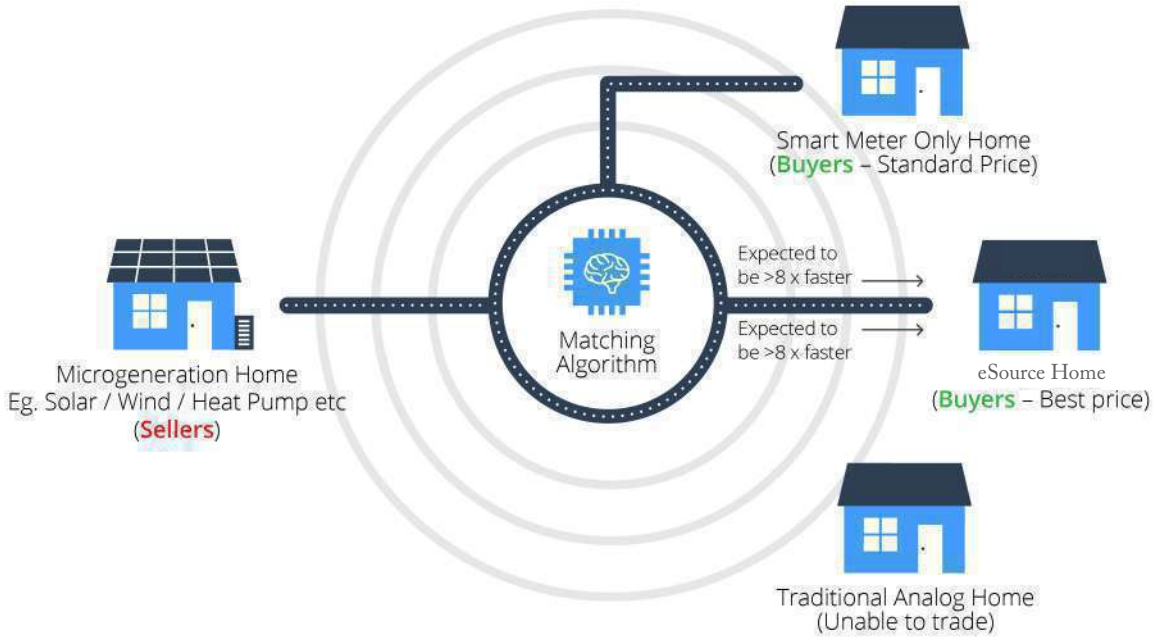


Prosumers within this community install a HH, attached to their main electricity meter, their solar array, and their battery (if present). The eSource app registers the prosumers to the TP platform.

Consumers within the network can either install a HH (attached to their main electricity meter) or they can use their existing smart meters to initiate a data feed to the TP.

4.2 Peer-to-Peer trading on the TP Network

TP's provision of a premium P2P trading experience begins with the collection of electricity consumption data to build up a history of each household's energy use at the appliance level. eSource thinks that more accurate forecasts on future energy requirements helps the consumers' TP systems trade faster and further ahead, and should help prosumers' TP systems maximise their generation/storage assets for maximum economic utility.



To illustrate the trading system, consider just two homes: one with solar/energy storage (Alice) and another without (Bob).

The energy trading process below may appear complex, but in practice it is anticipated that users will simply have the option to set their preferences in the TP app (if they choose), and we anticipate that all trading will occur automatically without user intervention. In this example, Alice has set her TP system to ensure her battery always retains at least 50% charge, and the minimum sell-price is 100c/kWh. The TP algorithms would be designed to automatically optimise trading to maximise revenue and minimise costs.

The software on Alice's system has been designed to recognise that if her battery has no stored electricity, and the solar PV is not generating energy, she will have to purchase energy from her electricity supplier for a higher price. Bob does not have generation assets, therefore his system's AI will only be able to consider his future demand forecast.

In order to decide whether energy should be transacted, the AI should take into consideration:

- Current battery state of charge
- Maximum battery capacity
- Forecast household demand for electricity
- Forecast generation of energy from solar panels
- Any additional input parameters set by users (e.g. minimum kWh charge of battery at all times, or maximum trade amount)

Step-by-step guide of trade matching algorithm

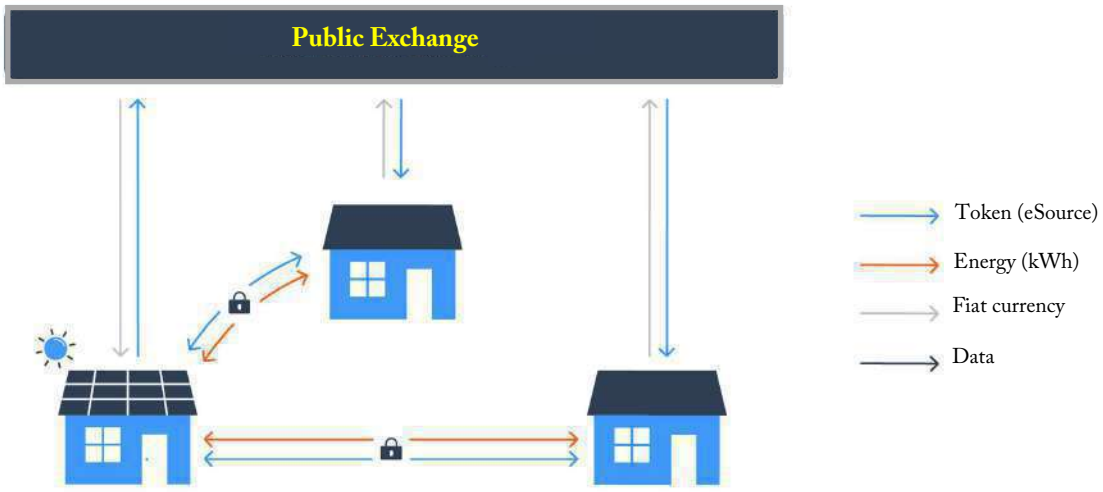
- At 7am, the sun is shining and Alice and Bob's TP systems begin analysing the next 4-hour period.
- Alice's TP system highlights a time window during the next 4-hour period where she can sell 1 kWh.
- Bob's TP system sees this capacity on the blockchain, and as his current cost of electricity from the grid is 124c/kWh(assuming you get your power from local vs non-local authority and monthly consumption is <600kWh in RSA) the system places a bid of 89c/kWh for Alice's surplus.
- Alice's TP system has already developed an optimal trading strategy for the best usage of her assets, so her system automatically places an ask of 108c/kWh (including associated transmission and network costs).
- During this first period of trading on the blockchain, no match is made.
- Without a match, Bob's system increases his bid. Similarly, Alice's system decreases her ask. This process continues until Alice's system's ask matches Bob's system's bid, and a smart contract is initiated.
- Having verified Bob has transferred the required money to the escrow, the TP's proof of delivery system verifies that 1kWh of electricity has left Alice's house, and 1kWh has entered Bob's house.
- The smart contract executes when proof of delivery has been confirmed: Bob's payment is made to Alice, with any other transaction costs transferred to the relevant parties.

In the example above, trades took place four hours in advance, however, with more data to refine, the forecasting and trading time window can increase. Greater forecast accuracy is expected to enable households with eSource units to trade further ahead each day, enabling further optimisation of trading decisions, which could allow households to capture the best prices for their system.

The description above illustrates how a single trade occurs; the following section explains how the trade fits within the larger TP ecosystem.

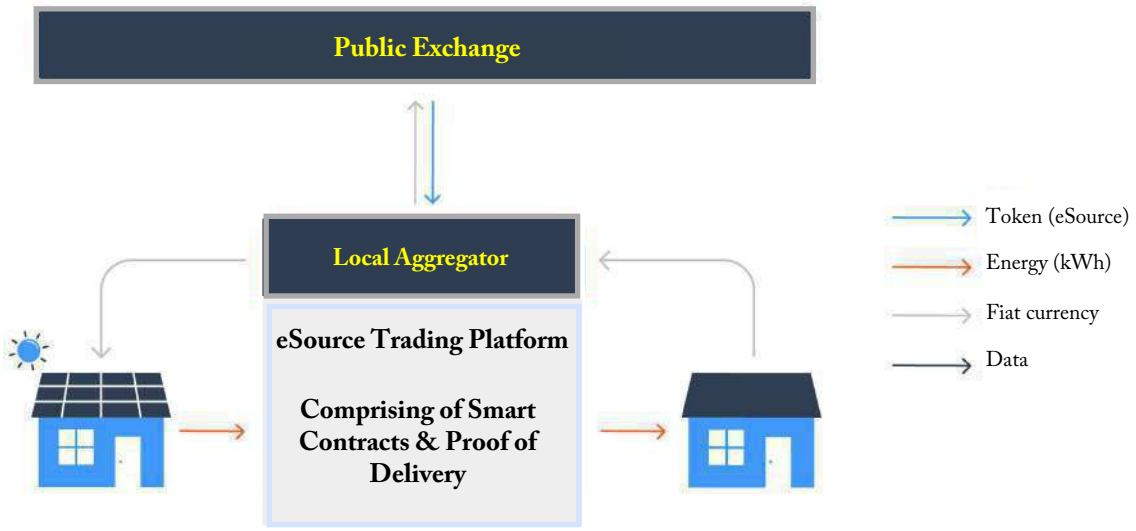
4.3 A system perspective: the TP and token ecosystem

Consider now a group of homes looking to trade with one another. For P2P trading to occur without a trusted third party, the community uses a blockchain platform with a smart contract. The smart contract allows two parties to enter in a trade agreement, and for the agreed funds to be held in an escrow while the exchange of energy takes place. However, as fiat cannot be used in the smart contract, each participant will have to trade tokens with a public exchange for use on the platform. eSource introduces the token to enable energy trading within the TP blockchain platform.



The diagram above shows a simplified representation of how such a system would work. However, in this system, each household would have to purchase tokens from a public exchange continuously, which would incur additional broker / exchange transaction fees.

To avoid this, the TP introduced local aggregators into the system. The aggregator purchases tokens from the public exchange and makes them available for prosumer and consumer households to use within their local area. Households will simply have to ensure they have the required fiat funds or billing permissions in their account, and have switched on the TP trading capabilities. Everything else will be automated.



A more detailed overview of the system is provided below

The ecosystem

Tokens

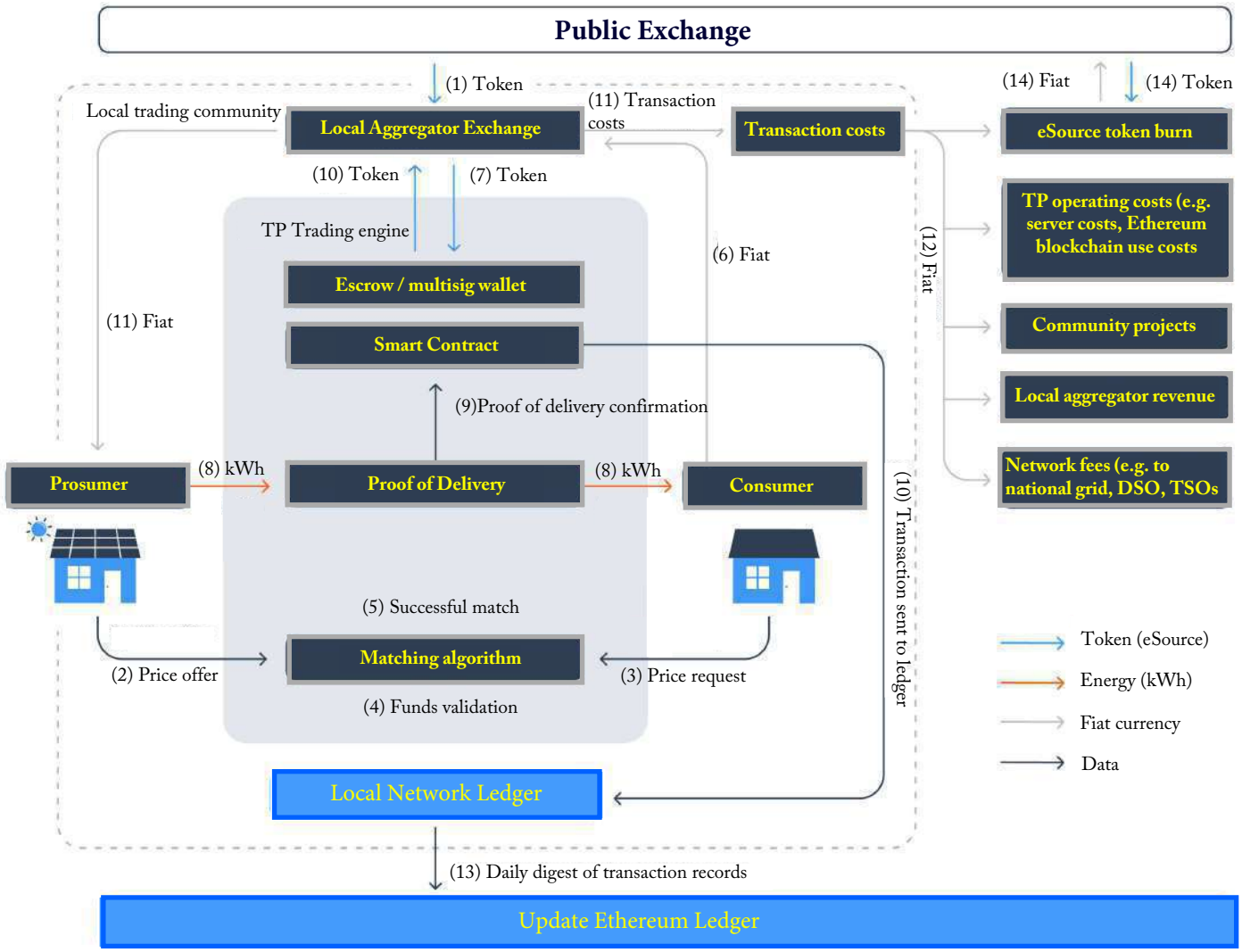
- Tokens will be utility tokens providing participation and reward capabilities within the TP. Every transaction that takes place on the TP requires eSource tokens. Local aggregators are required to stake tokens to access the platform, reducing token velocity and the number of tokens in active circulation.
- Tokens will be purchased on the public token exchange by 'local aggregators' to enable energy trading within a local trading community (see below).
- Tokens may be traded on the public exchange for fiat, or they may be redeemed for other goods and services (e.g. in-app upgrades, HH add-on services), or to purchase HHs for friends and family. All token holders will receive a code for discounts off the retail price of a HH at the conclusion of the main token sale.
- Tokens can also be provided as reward for developing HH and TP capabilities, in innovation contests, or for winners of eSource-hosted hackathons.
- Some percentage of proceeds from platform fees will be exchanged for tokens and could be potentially burned in a smart contract. Burning tokens will increase the scarcity of the token.
- Through a local aggregator, consumers and prosumers are not required to purchase tokens directly from a token exchange to participate on the platform: any interaction with tokens will be automated through the TP software. As prosumers and consumers exchange fiat and tokens instantaneously at spot prices, they should not be exposed to volatility in token prices.
- In the long term, if, as expected, electricity systems become more deregulated and regulations change to accommodate P2P trading, prosumers and consumers will be able to buy tokens directly to trade with one another. If they choose to, they will be able to purchase tokens and create/join their own user communities.

Local Aggregators

- Local aggregators provide an agent function for each local trading network, enabling prosumers and consumers within their network to trade electricity on the TP. Local aggregators provide tokens for households to use within their local trading community.
- Local aggregators can be, for example, utilities suppliers or commercial electricity generators.
- Each local aggregator community will contain approximately 100-500 households; if the community grows beyond 500 households, it will be split into two communities according to households' postcodes, etc. By capping the size of local communities, this limits the size and complexity of the local blockchain ledger. These communities are expected to be local in order to minimise grid transmission costs.
- Local aggregators can set a local aggregator fee for all transactions that take place within their local trading community.
- The system will allow real-time trading across multiple local communities and aggregators should they choose.

Prosumers & Consumers

- The interaction of the prosumers and consumers with the TP is intended to be as minimal as possible. Users would have to opt-in to the TP, and may set some parameters (e.g. trade only solar PV energy, battery maintains at least 50% charge). All further trading will be automated, without intervention from the user.
- Prosumers and consumers' devices agree a trade in fiat (e.g. Rands, USD), however, the transaction will require tokens to be executed: this will occur behind-the-scenes, without prosumers and consumers needing to be aware of the use of tokens.
- As the HH generates more energy user data, the TP's neural network algorithms adapt to user behaviour and preferences, providing a consistent trading experience, increasing product relevance, and avoiding user disengagement.
- The first 50,000 HHs will be sold with an amount of tokens pre-loaded. These tokens can be exchanged for credit when the user joins the platform, or used to redeem a range of eSource in-app upgrades providing additional services and functionality.


Public Exchange
(1) Token
Local trading community
Local Aggregator Exchange
(11) Transaction costs
Transaction costs
(14) Fiat
(14) Token
eSource token burn
(10) Token
(7) Token
TP Trading engine
TP operating costs (e.g. server costs, Ethereum blockchain use costs
(6) Fiat
(12) Fiat
Escrow / multisig wallet
(11) Fiat
Smart Contract
Community projects
Local aggregator revenue
(9)Proof of delivery confirmation
Prosumer
(8) kWh
Proof of Delivery
(8) kWh
Consumer
Network fees (e.g. to national grid, DSO, TSOs
(10) Transaction sent to ledger
(5) Successful match
Matching algorithm
(2) Price offer
(3) Price request
(4) Funds validation
Token (eSource)
Energy (kWh)
Fiat currency
Data
Local Network Ledger
(13) Daily digest of transaction records
Update Ethereum Ledger

To illustrate the TP trading in greater detail, consider a single local aggregator in the diagram above. Note that we anticipate that steps 2-12 will be automated by the eSource trading engine, and will not require active input from any of the participants (i.e. prosumers or consumers).

First, a local aggregator will have to create a local trading community. A local aggregator purchases tokens from a public token exchange.

With an established local trading community, consumers and prosumers are able to trade with one another. A prosumer has a kWh energy surplus and the TP automatically places an offer ("ask") to the matching algorithm to sell a kWh at a particular price, which includes any associated transaction costs.

A consumer has a kWh energy requirement and the TP automatically places a request ("bid") to the matching algorithm for a kWh at a particular price.

On receiving a request, the matching algorithm validates that the consumer has the funds, either via prepaid fiat in the consumer's TP wallet, or via a billing relationship, to pay for and fulfil the request for 1 kWh.

On a successful match of requests, the order is sent to the trading algorithm for fulfilment.

Energy trading within the TP must take place with tokens. The consumer sends the agreed amount in fiat to the local aggregator, and the local aggregator provides tokens to enable the transaction.

The consumer's tokens are held in escrow until exchange of energy has been verified.

A kWh is sent from the prosumer to the consumer.

When this exchange is confirmed by the TP (through "Proof of Delivery"), the smart contract executes the transaction.

Tokens are released from the escrow. The local community ledger is updated.

The corresponding amounts of fiat are sent to the prosumer and the local aggregator to cover grid and transaction costs. Operating fees cover any server, processing, and Ethereum blockchain costs associated with the transaction. Where the local aggregator has an established relationship with transmission and distribution operators (e.g. if they are an existing energy retailer), they may decide to pay the electricity transmission and distribution costs directly.

All relevant fees are distributed to the involved parties, e.g. network fees, local aggregator fees, tax, and eSource platform costs.

On a daily basis, the local community ledger publishes a digest of all transactions to the public Ethereum ledger.

eSource plans to operate a model for the TP. A portion of fees collected from paying users will be committed to communities, not-for-profit projects, and/or will be exchanged for tokens to potentially be burned.

Note that tokens are returned to the local aggregator by the end of the trade, so they will not need to continuously purchase tokens.

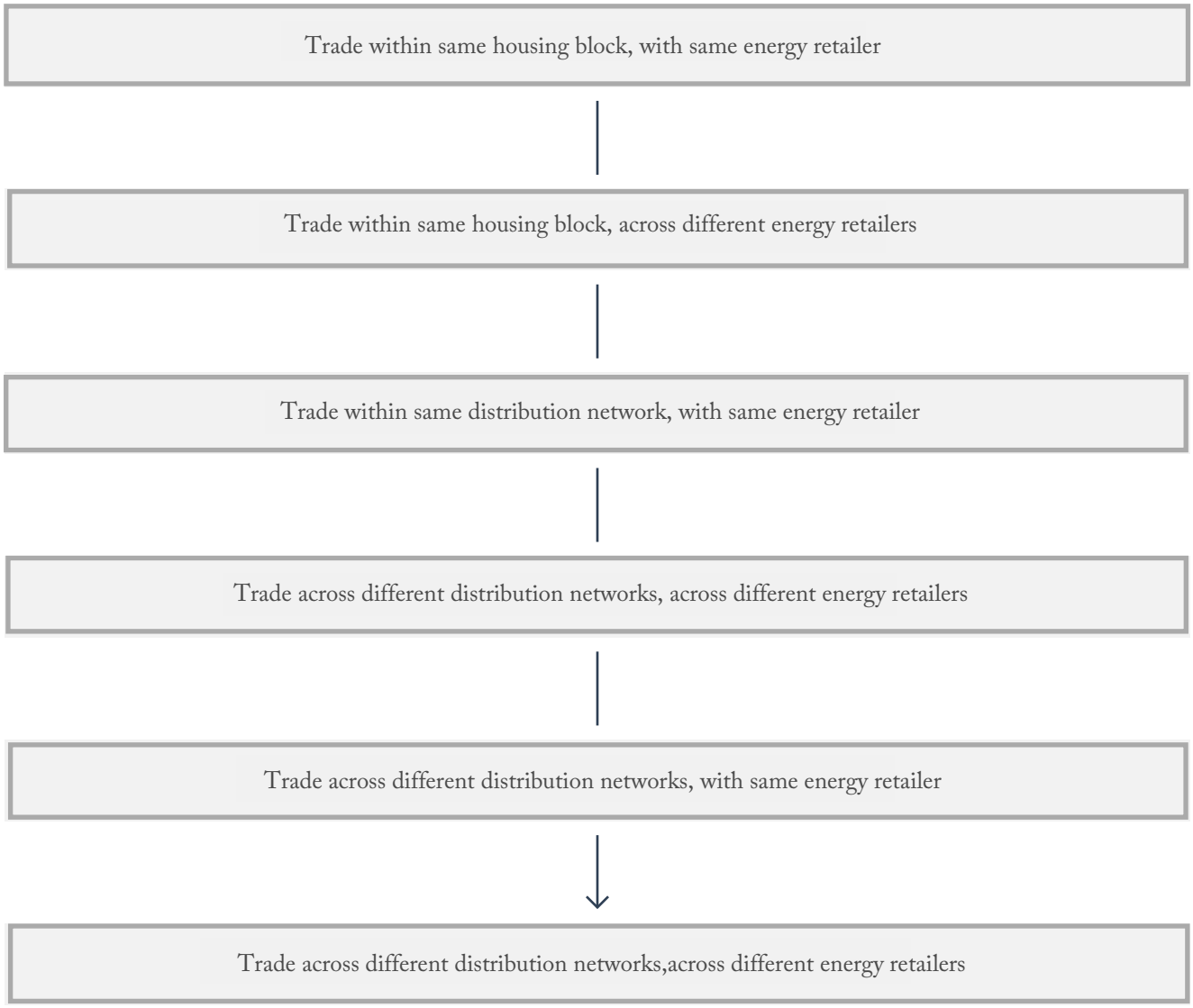
Where appropriate, trading may occur with digital representations of tokens or fiat, to accommodate the technical requirements of the platform.

4.4 The development of the TP platform

The current depiction of the TP platform illustrates energy trading between households within the same local trading community. However, the goal of the platform will be to integrate all participants such that generated energy can always be traded on the TP, reducing the likelihood of a non-match.

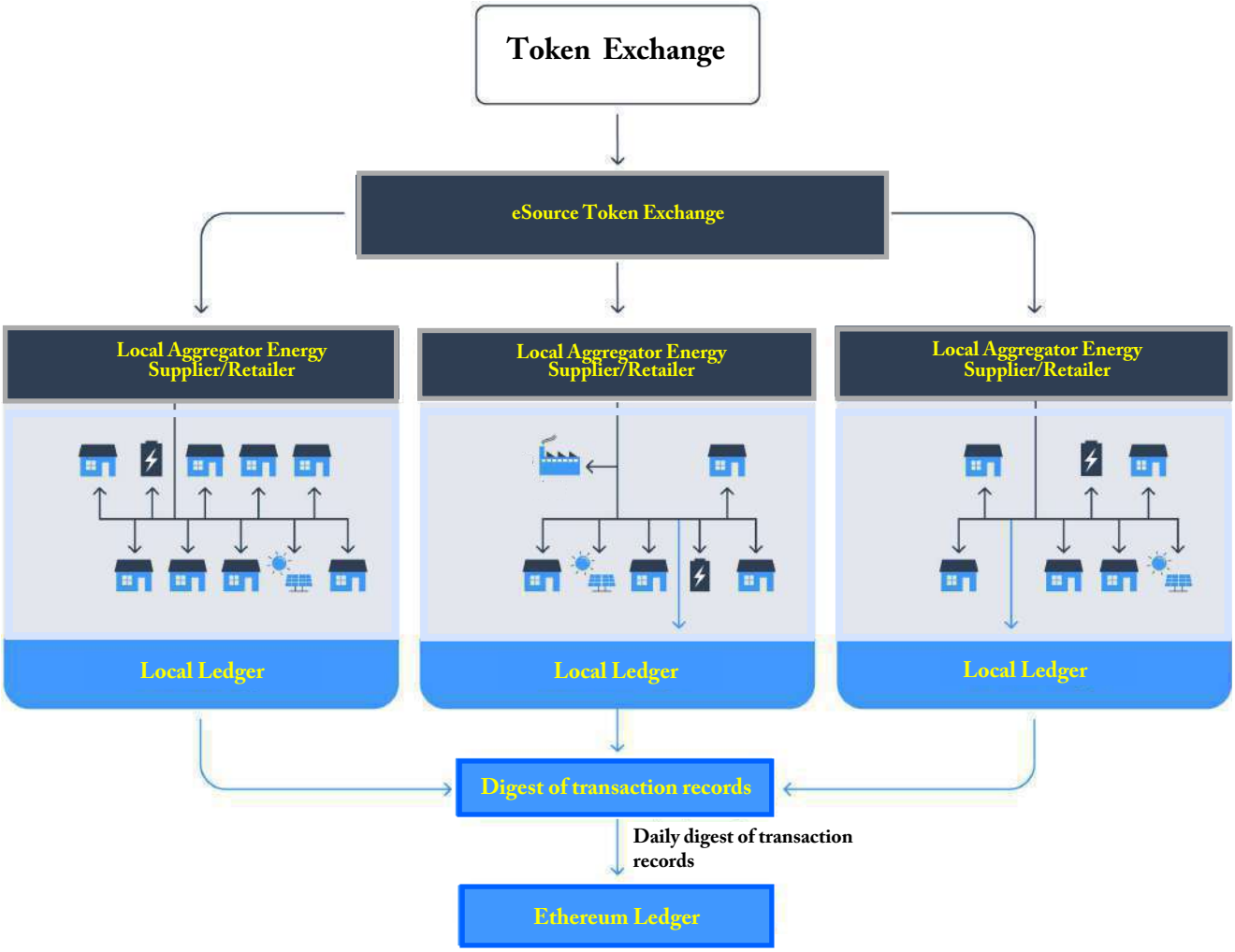
Trading between participants will occur according to a hierarchy that optimises for transactive efficiency, taking into account network relationships.

For example, the hierarchy might be:



eSource intends for the platform to be flexible and easily scalable. eSource views the aggregator model enables the platform to be customised for varied use cases, e.g. used by electricity retailers vs. housing estates vs. EV charging, while using hash functions and transaction digests to reduce the volume of data stored on the public Ethereum ledger.

As the platform develops, more transactions take place, and more participants join the platform, eSource will adapt the TP to accommodate new use cases, which will affect the value of the token. In the future, eSource plans for a minimum committee of experienced specialists (including industry experts and academics) to manage the TP. This may include a further token burn and mint function, modified smart bonds, or a staking function.

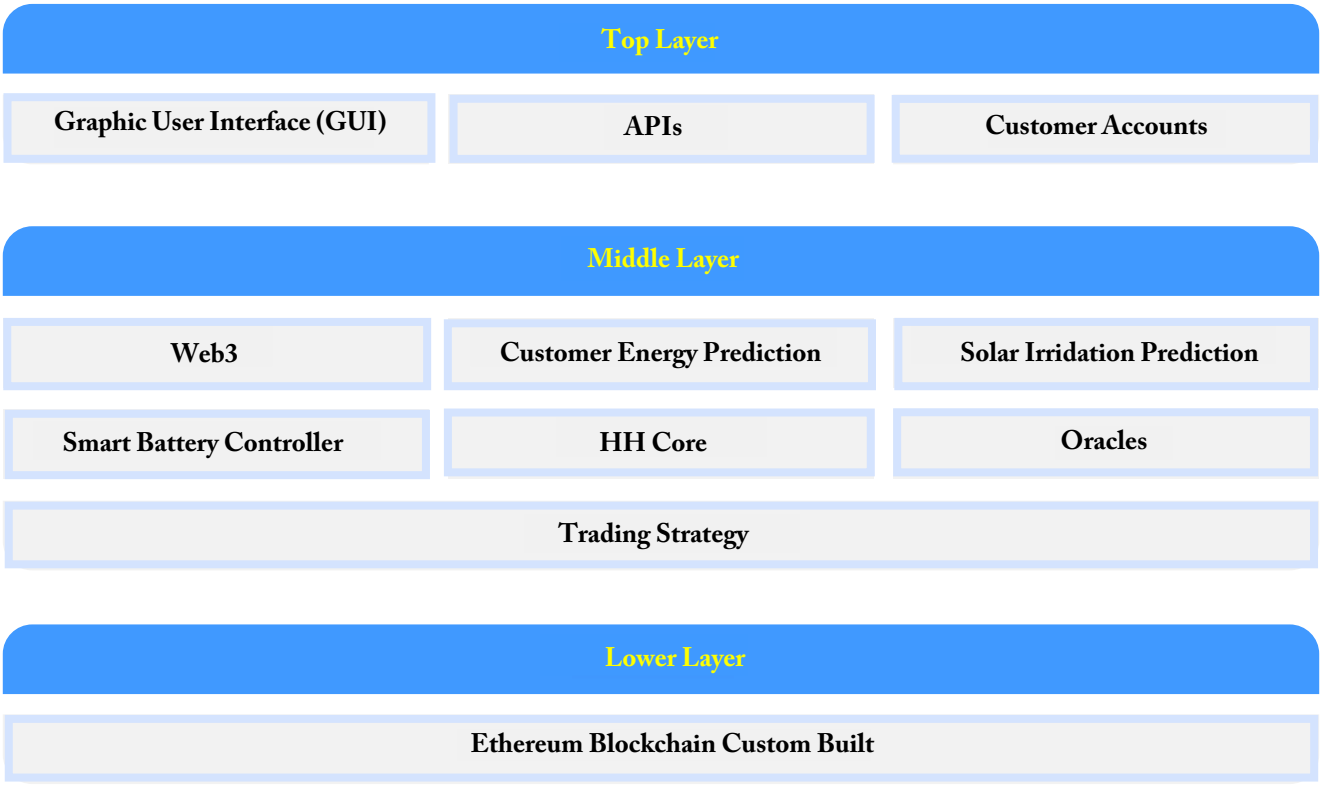

Token Exchange
eSource Token Exchange
Local Aggregator Energy Supplier/Retailer
Local Aggregator Energy Supplier/Retailer
Local Aggregator Energy Supplier/Retailer
Local Ledger
Local Ledger
Local Ledger
Digest of transaction records
Daily digest of transaction records
Ethereum Ledger

4.5 TP Platform Technical Details

For the TP's initial system, the platform will use the Ethereum blockchain to create smart contracts and verify the ledger. The system will allow for a flexible transition in the future to the optimal stack and toolset depending on the reliability and access speed required.

Ethereum is eSource's current blockchain of choice due to its global traction, high calibre team, and flexible, open source software. eSource's customised version of the Ethereum blockchain will maintains immutability of trading records through digesting all TP token activity back to the public Ethereum blockchain. We would be designing the system with the intention of being able to adapt the TP from Ethereum to another public blockchain platform in the future should the need arise.

We are planning to utilise a Proof of Authentication framework to validate blocks on the local community ledger. Initially, local aggregators will be able to act as the 'authenticators' and will be rewarded for validating blocks and penalised for not validating blocks correctly.



Technology Details

- Programming languages: Python, JavaScript
- Smart contracts written in Solidity
- ERC-20 token standard

System Security

- 256-bytes encryption for data transfer from AWS to VHH
- SSL certificate security
- Transactions processed on the box, mitigating exchange tamperability
- Operating System and memory on VHH are encrypted by AES
- Multi-key signature capabilities for customer accounts

4.6 Additional TP applications

The previous sections have illustrated the value of the TP for P2P trading; however, applications can be more diverse, with other stakeholders participating in the system. For example, electric vehicles charging providers may be able to act as aggregators, and distribution network operators can purchase bespoke demand response services from the TP. The TP should be designed with the intention of providing a flexible and multi-purpose platform, which eSource thinks will provide a future-proof solution to the forthcoming changes to the energy sector.

Electric Vehicle (EV) charging

By 2025, industry experts estimate that one in every six cars will be an EV. With such rapid adoption, their integration with the electricity grid is forecast to become increasingly important. First, the grid will need to accommodate the additional demand for energy required to charge EVs. Second, EV batteries can provide critical balancing services to support distribution system operators (DSOs).

The development of a vehicle-to-grid (V2G) network could enable energy stored in EV batteries to support the energy network when demand is high, and for EV batteries to be recharged during times of low demand. Bi-directional energy flows from EVs to the grid could provide additional grid stability and greater system resilience. V2G networks are being tested globally, with projects underway in countries from Germany and Denmark, to the USA.

The management of EV charging infrastructure is expected to be critical. It is expected that charging outlets will need to co-ordinate a large network of charging nodes, which may be owned by a number of independent actors. EV owners may be able to set a range of parameters to ensure their requirements are met, for example:

- Battery has a minimum level of charge (e.g. to complete a specific trip from work to home)
- Battery only charges during certain time periods (e.g. during off-peak hours between 1am and 5am)
- Battery only charges at a slower rate (to spread draw from grid over a longer time period)
- Battery charges in specific locations that have lowest grid demand

eSource plans to provide valuable support by:

- **Providing a central marketplace and platform** for charging outlets, prosumers, EV owners and DSOs to co-ordinate prices, demand, capacity, and demand response (DR) services
- **Monitoring batteries state of charge:** providing EV owners with a view of their current battery state / vehicle range
- **Optimising battery charging/discharging:** balancing the requirements of an EV owner with optimum charging patterns for the EV charge provider
- **Streamlining the transaction process:** providing a low-cost, efficient, and automated means of settling transactions for each charging/discharging event

Charging outlets may be able to become an aggregator and EV owners may be able to pre-purchase energy on the TP platform and trade energy throughout the day, optimising for prices, grid demand, and their specified requirements. They may also be rewarded for parking their cars in areas of excess demand or excess supply, to provide additional local battery capacity – similar to Uber's use of surge charging in peak geographical areas.

DNO / DSO services

Distribution network operators (DNOs) are responsible for maintaining distribution infrastructure. With increasing local renewable energy generation needing proactive management, their role has expanded to include systems operations through new digital toolkits that communicate between the network's main nodes.

Distribution system operators (DSO) provide a medium for grid participants to be financially compensated when supporting a balanced network. For example, 1) Incentivise reduced consumption (i.e. ensuring key electrical appliances are turned off at peak demand points throughout the day), 2) incentivise micro renewables actively feeding back to the grid, 3) incentivise consumers to place increased draw on the grid through turning on their high draw electrical appliances, 4) incentivise those with storage systems to manage their charge/discharge in consideration of the wider network.

With the HH's AI capabilities and ability to provide ultra high-resolution, real-time data, eSource is hoping to be able to provide DSOs with real-time updates and forecasts for energy demand, microgeneration, and storage utilization. Detailed electricity data and accurate consumption and generation forecasts can help DSOs reduce operational costs by enabling them to utilise lower cost demand response capabilities. Through the TP platform, DSOs could financially incentivise householders to turn ON/OFF key household appliances and storage facilities throughout the day, to ensure the network is balanced based on its current generation activity. As smart plugs and smart appliances become more common in households, automated domestic demand response is anticipated to be a powerful service that can significantly support DSOs in managing network constraints, avoiding network reinforcements, and balancing the grid.

Carbon monitoring

The TP would be designed to track every kWh of electricity traded on it, from point of generation to point of consumption. With electricity monitoring, verification process, and immutable blockchain ledger, eSource should be able to provide monitoring and reporting services for organisations' energy consumption, renewable generation, and EV usage.

The robust supply of data accessible to anyone within the commercial TP framework can potentially support carbon traders and provide organisations looking to offset their carbon with a verified source that should stand up to regulatory scrutiny. The reporting process may also provide automated carbon emissions reporting for compliance with government environmental schemes.

Microgrids

Microgrids are localized groups of distributed energy sources and loads that typically connect to and operate in parallel with incumbent centralized grids (macrogrids). Traditionally, they have been co-ordinated according to geography or function (e.g., a university campus, residential neighbourhood). Fully disconnected microgrids are referred to as islanded.

Microgrids are expected to play an increasingly important role in government energy policy, due to their ability to provide energy resilience and mitigate against a community's vulnerability to power outages, ageing grid infrastructure, and exposure to energy imports. Investments in microgrids are expected to grow at 12% (2016-2022), and with 1.1 billion people lacking access to electricity globally, estimates suggest 50 to 60% of additional generation required will be supplied by microgrids.

Thus, in order for microgrids to be globally scaled and considered a reliable backup to centralised grids, the issue of autonomous voltage and frequency control must be overcome. This occurs when the microgrid becomes unbalanced (i.e. power not being generated at the same rate as demand), and the system's voltage frequency deviates its target value. Communities will require dedicated microgrid controllers to ensure voltage and frequency control is managed.

eSource believes the TP and HH monitoring can help to manage autonomous balancing, providing critical services to support the roll-out of microgrids across the planet.

Tokenisation and monetisation of data

eSource views the combination of the TP and HH would generate extensive amounts of data which should be of significant value to many stakeholders, for example, utility companies, energy traders, consumer companies (e.g. Amazon, Apple, Samsung) and distribution and transmission network operators.

As the TP platform develops, energy consumption data and energy transaction data could be tokenised and integrated into the TP. With the HH's ability to disaggregate energy use by appliance, the TP will have access to extensive datasets on appliance use within households, for example, appliance performance, reliability, and patterns of usage.

Currently, appliance manufacturers sell electrical appliances to retailers and have limited visibility on how the appliances are used in their customers' homes, but the HH could provide manufacturers with great insight into appliance use and performance beyond the factory door.

Furthermore, detailed patterns of appliance-level energy consumption can provide distribution and transmission network operators with more accurate predictions of electricity requirements, and therefore optimise energy generation and storage accordingly. It could further enable them to segment customers according to appliance use patterns and, for example, encourage energy use behaviour changes that support the grid balancing requirements.

eSource believes that energy use data and energy trading data have significant value that is currently under utilised and under recognised. The cmbination of the TP and the HH provides the ability to unlock this value, and the tokenisation of data allows for easy access to these datasets.

Households who are willing to share their anonymised data, and individuals and organisations who provide data cleaning and processing services could be rewarded in tokens; organisations may purchase energy use data or information using tokens.
eSource intends to fully integrate the platform with energy data. Households, companies, and organisations who wish to sell or purchase data will be required to stake tokens for access to the platform, and tokens are required to purchase data.

All data has been designed to be anonymised and eSource will take the utmost care to ensure that all data protection laws and regulations are adhered to.

5 - Economic Model

Should the ITO be successful, eSource intends to develop a business model, which would provide all users the option of accessing the platform for free, with the option of purchasing additional features, services, or capabilities. In the long term, we estimate costs will be 1% of total transaction value.

5.1 Value Propositions

eSource thinks the TP will have many applications and benefits for a range of stakeholders within the energy ecosystem. The benefits of P2P trading combined with high resolution energy data extends beyond households and prosumers, to network system operators and electricity suppliers.

A summary of key stakeholders and how eSource believe they will benefit from the TP is shown below:

Stakeholders	Benefit
Households - consumers	• **Cost savings:** On existing electricity bills (excl. cost of hardware device) • **Incentivise local generation of energy**
Household/ SMEs - prosumers	• **Additional revenue generation:** Owners of solar microgeneration units. • **Reduces payback time:** better monetisation of surplus kWhs over the feed-in tariff
Small scale generators	• **Additional revenue generation:** revenues are expected to be higher than those received on the wholesale electricity market • **Reduces payback time:** improved profits are expected over wholesale market prices
Community groups	• **Promotes social cohesion:** prosumers and consumers can support community programmes, schools, community buildings etc. by selling or buying electricity from community groups • **Improves community electricity resilience:** encourages installation of community microgeneration and storage, providing emergency electricity provision during blackouts
Retail energy suppliers	• **Reduces bad debts:** as the TP is token-based and users purchase tokens in advance of use, bad debts are expected to be reduced for trades on the platform • **Real-time billing reconciliation:** blockchain transactions are expected to be verified on an on-going basis, helping to remove delays between electricity consumption and billing • **De-centralised platform for local, sustainable electricity:** TP provides a de-centralised source for purchasing electricity with verified provenance
DSOs/DNOs/ System operators	• **Condition monitoring and predictive maintenance:** eSource's high frequency sampling of electricity generates advanced power quality data (e.g. data on voltage frequency /harmonics), which can be used by network and system operators to pre-empt potential problems before they occur • **Capacity, balancing and DSR services:** TP is expected to function as a central platform of supply and capacity which can provide additional capacity, network balancing and demand response (DR) services

Government/ Regulators	• **Meeting decarbonisation targets:** improved incentives for renewables generation will encourage installation, helping to meet decarbonisation targets • **Increased consumer choice:** greater competition in what may be considered a traditionally concentrated market in many countries, resulting in more choice and better outcomes for consumers
Additional use cases	• **EV charging payment solution:** EV charging outlets should be able to use the TP to make payments between charging infrastructure providers, electricity generators, and EV users • **Microgrid balancing and monitoring services** • **Carbon accounting services:** with a comprehensive view of the provenance of electricity and kWh traded, the TP should be able to automate carbon reporting and accounting for companies and organisations

5.2 Customer Segments & Distribution Channels

eSource forecast early adopters are most likely to be:

1) Those who will benefit most economically from TP utilisation (i.e. users with microgeneration or energy storage)
2) Sustainable / eco-conscious communities with existing microgeneration
3) Low-income / price-sensitive households
4) Early-adopters of cutting-edge tech products

The roll-out for HH and TP is expected to be co-ordinated such that HH customers can further reduce energy costs by sourcing competitively-priced and sustainable electricity on the TP, while the TP will benefit from a growing HH user base and more participants on the platform.

Through a process of developing key relationships across core distribution channels, should enable rapid access to a large group of users, who are most likely to benefit or take interest in the TP.

Early adopter	Anticipated benefits of product offering	Planned HH distribution channels
1) Users who benefit most economically from TP utilisation	• TP should increase income from renewable and storage assets • TP should reduce payback time for further investments	• Battery and home storage solution providers • Solar panel installers
2) Sustainable / eco-conscious communities with existing microgeneration	• TP should increase income from microgeneration sources and improve the business case for installing more renewable and storage capacity • HH should help community households use less electricity and save money	• Community groups • Community-based organisations (e.g. schools and hospitals)
3) Price-sensitive or low-income households and small businesses	• HH should help households consume less electricity • TP should help households source the cheapest electricity	• Insurance companies • Utility companies / energy suppliers (Energy retailers & power utility companies) • Community groups
4) Tech early-adopters	• HH and TP should provide industry-leading cutting edge technology in NILM, data disaggregation, blockchain & AI	• Direct to customers (B2C) via online retailers (e.g. Amazon) and in-store sales (e.g. electronic retailers)

We anticipate a growing market for P2P energy trading, as the number of properties with PV panels continue to rise.

Beyond the early adopter phase, eSource will focus on developing partnerships with providers of essential householder services: internet and phone providers, water companies, local councils, and major utilities.

5.3 TP Technical Development Roadmap & Commercial Plans

An outline of eSource's proposed technical roadmap and key targets are provided below:

Trial Launch

Launch of first blockchain P2P energy trading. Installation of hardware and recruitment of participants at trial site.

Public Blockchain

Transactions visible on the Ethereum public Testnet.

Technology Develoment

Electrical generation and consumption prediction algorithms introduced into live system. eSource's combined three channel CAD units deployed.

Blockchain

Transition to a private permissioned blockchain, minimizing carbon footprint of the blockchain solution.

Engaging Early Abopters

Planned roll out of energy trading platform to early adopters for trial.

Scheduled Beta Test of Blockchain

A blockchain of blockchains containing digests of transactions would be rolled out to our trial sites.

Product Development

Planned automatic integration of the TP into eSource units, available for public roll out. Planned international system established.

Full Scale Rollout

eSource fully operational, wide-scale rollout. Inclusion of next generation of Apps and third party services.

eSource intentions are to utilise funds over a 4 year period to develop all the features, functionality and current ideas of the platform.

Core targets

- Sell 2,000 HHs which can receive automatic firmware updates to begin trading on the TP
- Trial to include more households
- Launch energy bill minimisation API, with automatic tariff switching and/or TP trading
- Establish first international commercial partners
- Develop control system for individual appliances
- Extend trading platform to accommodate energy trading between 5,000 homes
- Develop software which enables automated control of household electrical appliances, to minimise energy costs
- Develop demand-side response product offering

5.4 Pilot Energy Trading Project Sample Across 100 Homes

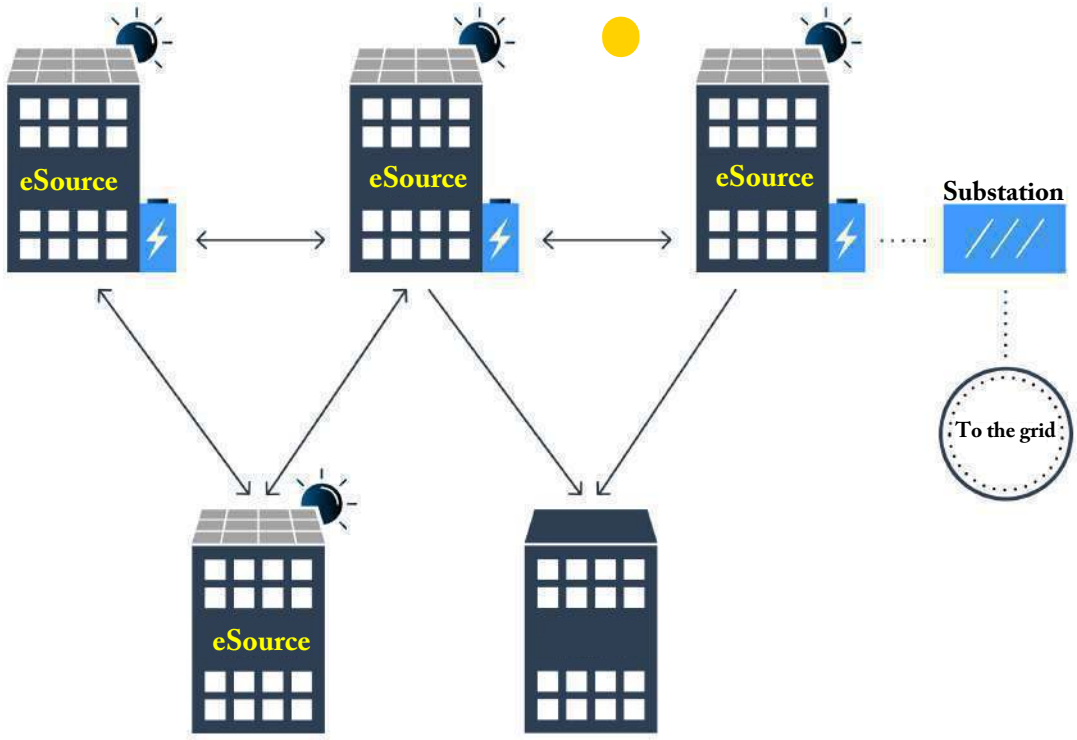
The project will focused on applying AI to the HH data feeds, to build up a detailed real-time picture of household electrical activity, and thus pinpoint the sources of generation and consumption. When this sample dataset combined with a blockchain-based trading platform, it is expected to enable electricity to be securely traded in real time at kWh data.

This project would enable a full version of the alpha TP trading algorithm simulation across 100 homes with on site storage and solar generation. This simulations would allow us to determine potential trading levels, system economics and algorithm efficacy. Learnings from this project would refine our primary blockchain algorithm.

5.5 Pilot Project Details

The initial field-trial will be the first-time energy has been legally traded in the country through a blockchain-based energy trading solution.

eSource (HH with additional blockchain functionality) would be installed in 40 participating flats to allow community residents to share lower cost renewable energy between one another at a significantly reduced rate, as well as benefit from the functionality of home energy assistant (providing real-time cost updates for key appliances, safety notifications if appliances are left on, and alerts if white goods are deteriorating).



The trial would require the installation of a communal battery storage provided by eSource partner. These batteries enable storage of solar energy for later use, or to trade between flats.

6 - Token Launch

To establish a blockchain trading platform, eSource plan is to hold an Initial Coin Offering (ICO) to sell tokens for use on the platform. eSource thinks the benefits of holding an ICO are three-fold:

- Accelerates funding for development of the platform and attract the best talent
- Provides us with the independence to build a trading platform that is truly consumer and end-user focused
- Generates global and high-profiled PR and marketing coverage for the eSource Trading Platform.

6.1. The Token

The utility token which eSource expects to enable token holders to participate in our energy trading network planned for development. It will be an ERC-20 token with a limited supply. We have discussed the technical details of the token and our trading network in depth in Section 4, however, there are some key aspects worth reiterating here.

Energy and data cannot be traded without tokens

Tokens are required for every single transaction within our network. Consequently, as our company grows and the number of organisations, consumers, prosumers and partners using the network increases, the demand for the token will also increase. Energy and data cannot be traded on the platform without the staking of tokens, which reduces token velocity and the number of tokens in active circulation.

Token burn function

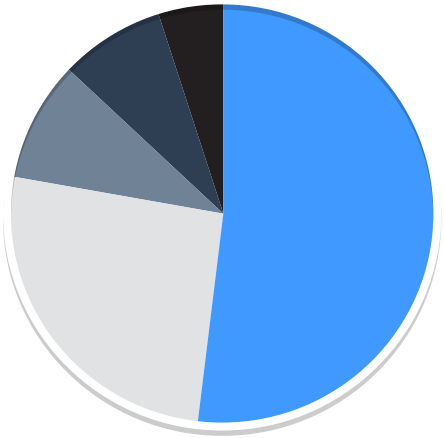
Every trade within the network will have a margin between the bid and sell prices which is used to cover transaction, transmission and tax costs. A majority of trades, after accounting for these costs, will still have a profit margin. This profit will be used in part to fund community projects, or potentially exchanged for tokens to be burned. As the trading platform grows and the number of trades taking place increases, the number of tokens that could be burnt will increase, reducing the limited supply of tokens.

6.2 Token Allocation

During the token sale event up to 70% of the total supply of tokens will be distributed to the public, 10% will be reserved for distribution among the first 200,000 HH units sold, and the remaining tokens will be kept by the company. Of the expected 20% of tokens kept by the company, 10% will be kept for the eSource float and original contributors, and 10% will be reserved for future growth. Tokens will not be able to be used in the trading network until the full launch of the TP,
Their primary utility before the launch of the platform will be the ability to buy eSource hubs.

6.3 Funds Allocation

The funds raised from the ITO will be used for development of the TP. 47% will be reserved for engineering, software, research and development, to continue building our blockchain trading technology and patent portfolio. 21% of the funds will be reserved for user acquisition, and building on our track record of delivering high impact, high value partnerships. 10% will be used to subsidise the cost of the first 200,000 HHs, accelerating adoption of the TP. 9% of the funds will be allocated for ongoing operations, with a further 8% used for legal costs and 5% will be reserved for contingency.



Engineering, Software,
User Acquisition & Customer
Ongoing Operations & Admin
R&D Legal Costs
Education Contingency

6.4 Our Token Sale Approach

eSource aimss to distribute tokens to as widespread a group of participants as possible, enabling everyone, regardless of the potential size of their contribution, to participate in the benefits of a decentralised energy ecosystem and our trading network. eSource aims to conduct the token launch in a manner consistent with absolute best practice, taking into consideration input from top advisors, utilising tools of key partners, and implementing the highest security standards.

It is important to allow key strategic partners to back our token. To assist us in developing a global energy trading network and token economy, we will be raising pre-sale funds subject to lock up clauses to support the stability of the token during its initial months and years. These token owners will not be able to trade their tokens on the public exchange for a pre-determined period of time.

eSource is looking to raise up to 70% of the tokens available in the ICO during the private pre-sale, with the remaining tokens potentially sold in the public sale.

6.5 The Pre-sale

Our pre-sale is limited to participants looking to contribute a minimum amount. eSource expects the majority of these tokens will go to long-term strategic partners, with conditions that require tokens to be locked up and vested for considerable periods of time. There will also be a limitation on total number of tokens that can be sold per day per account to minimise volatility in prices.

6.6 The Public Whitelist

The plan is that the main public sale of tokens will occur via a whitelist running over three days. Contributors who have registered to the whitelist would be guaranteed an allocation in the first 24 hours of the main sale subject to a maximum contribution to ensure a fair distribution for registered contributors. By running a whitelist, we would be able to distribute token ownership fairly, mitigate the risk of network congestion caused by the token sale, and avoid potential human errors that can arise due to a rushed purchase of tokens.

First day whitelist contributors will receive a a token bonus. Any remaining unsold tokens will be offered to the public on the third day.

6.7 The Future Economy

eSource foresees the token launch would generate a vibrant P2P energy network, enabling token holders to save money on their electricity costs. eSource believes the network utilises surplus energy and reduces energy waste, which is a problem prevalent in the current energy distribution systems.

We believe that as we bring new partners and energy providers on board, adding additional energy generating units across the grid to our trading network, the energy evolution will accelerate and the value of tokens increase. eSource believes strategic partnerships, including key partnerships will allow our token economy to make step-change improvements, as we connect large networks of consumers and prosumers to the TP.

eSource will publically announce its intention to sell any tokens prior to sale on a token exchange.

Conclusion

In response to the challenges facing the current energy systems, eSource believes a P2P energy trading platform is needed to provide a sustainable, democratized and economically efficient electricity grid. Following a successful roll-out of the Home Hub, we would develope a blockchain energy trading platform that would enable users to trade excess energy with one another. eSource sees a P2P system will encourage investment in sustainable energy generation and storage, and engage users to improve the resilience, reliability, and affordability of the energy ecosystem.

This whitepaper outlines the key components of our plans to make the eSource Trading Platform (TP) a reality, and the ICO for the tokens will provide supporters with an opportunity to accelerate the future of the energy system. As the platform develops and its user base grows, eSource believes the value of its token will increase.

At its core, the token is required to enable users to trade electricity on the P2P TP. The platform makes trading as simple as possible, with automated trades occurring without user intervention. The TP is expected to optimise trading strategies using energy demand data and generate predictive algorithms, which should enable households to minimise their household energy cost while purchasing electricity from renewable sources.

eSource thinks the TP will provide the flexibility and capability to integrate many use cases, including electric vehicles charging, demand response services, carbon monitoring and reporting, and data and information provision. The strength of the TP will increase with each additional use case, generating greater utility and value for its token.

eSource understands the existing capabilities in non-intrusive load monitoring, energy data disaggregation, machine learning and AI, would provide a clear foundation for developing an unparalleled P2P energy trading platform.

Associated Risks

Risks associated with energy industry regulation on peer-to-peer trading
The energy industry is a highly regulated sector, and the success of a peer-to-peer trading solution will require co-operation from energy regulators around the world. If governmental authorities do not agree to permit peer-to-peer energy trading, the mechanism of the trading platform may have to be modified, requiring corresponding changes to eSource's execution and roll-out plan. While a number of energy regulators appear to be encouraging innovation in peer-to-peer energy trading (for example, with the introduction of the Ofgem Sandbox in the Europe), if regulation is changed to prohibit peer-to-peer trading in the future, the utility of the platform could be significantly reduced.

The proposed structure of the current peer-to-peer trading business model relies on utilisation of existing grid infrastructure, which are owned or managed by distribution and transmission network operators, and distribution and transmission system operators. In the event that network and system operators do not permit peer-to-peer trading to occur on their network, or charge a prohibitively high fee for use of their network, this would pose significant risk to the economic viability and
scalability of the peer-to-peer trading model.

Risks arising from the energy industry and energy market
The energy industry and by extension the eSource Platform (the "Platform") is subject to a variety of state and international laws and regulations, including those with respect to health and safety, environmental issues, competition, and customer due diligence procedures, privacy and data protection, consumer protection, data security, and others. These laws and regulations, and the interpretation or application of these laws and regulations, could change. In addition, new laws or regulations affecting the eSource Platform could be enacted, which could impact the utility of tokens in the eSource Platform. Additionally, users are subject to or may be adversely affected by industry specific laws and regulations or licensing requirements. If any of these parties fails to comply with any of these licensing requirements or other applicable laws or regulations, or if such laws and regulations or licensing requirements become more stringent or are otherwise expanded, it could adversely impact the eSource Platform and the token, including its functionality to obtain or provide services within the Platform. These regulatory changes in the energy industry could negatively impact on the value of the tokens.

Risks associated with uncertain regulations and legislative actions in relation to issuing and trading cryptographic tokens
The regulatory status of cryptographic tokens, blockchain, and distributed ledger technology is unclear or unsettled in many jurisdictions. It is difficult to predict how or whether legislatures or regulatory agencies may apply existing regulation or implement changes to law and regulation with respect to such technology and its applications, including the eSource Platform and tokens. Regulatory actions could negatively impact the Platform and tokens in various ways, including through a determination that tokens are a regulated financial product or instrument that attracts registration or licensing requirements, or prohibiting their transfer, sale or offering. These potential changes in how tokens are regulated could negatively affect their value.

Risks associated with uncertain regulations and legislative actions in relation to buying and selling energy with cryptographic tokens and blockchain technologies
It is possible that certain jurisdictions will apply existing regulations on, or introduce new regulations addressing, blockchain technology based applications, which may be contrary to the current setup of the Smart Contract System and which may result in substantial modifications to the Smart Contract System and/or the eSource Platform, including its termination and the loss of tokens for the user. Additionally, regulation of proposed activities of the eSource Platform is currently uncertain. It is not known what regulatory framework the proposed eSource Platform and associated activities will be subject to, the nature and obligations that will be imposed on the Company in order to comply with any such regulatory framework or when/if the Company will even be able to apply to be regulated, or successfully obtain the necessary licences so that it may lawfully carry out its proposed business activities.

eSource may cease operations in a jurisdiction in the event that regulatory actions, or changes to law or regulation, make it illegal to operate in such jurisdiction, or commercially undesirable to obtain the necessary regulatory approval(s) to operate in such jurisdiction. eSource could be impacted by one or more regulatory enquiries or regulatory action, which could impede or limit the ability of eSource to continue to develop the Platform. For example, regulations could be introduced to prohibit peer-to-peer trading of electricity with decentralised and distributed ledgers, which would prohibit eSource from operating in those jurisdictions.

Risks associated with limited track record
The token and the Platform will be newly created entities without track record in blockchain peer-to-peer trading platforms, therefore heavily dependent on the experience of the leadership and advisory group. The token and the platform is therefore subject to the business risks and uncertainties associated with new business enterprises, including the risk that the platform and token will not achieve their roll out objectives, and that the value of the token could decline substantially.

Risks associated with the development of the platform
The Platform is currently under development and will undergo significant changes before release and over time, including a change in direction at eSource's discretion. Although eSource intends for tokens and the Platform to follow the specifications set forth in the whitepaper and intends to take commercially reasonable steps toward those objectives, eSource may have to make changes to the specifications of tokens or the Platform for any number of legitimate reasons including, but not limited to, a change in the design, implementation plans and execution of the implementation of the Platform for global release. Moreover, we may not be able to retain full and effective control over how other participants will use the eSource Platform, what products or services will be offered through the eSource Platform by third parties, or how third-party products and services will utilize tokens. This could create the risk that the Platform or tokens, as further developed and maintained, may not meet expectations either at the time of purchase of the token or in the future.

While eSource will make reasonable efforts to complete the Platform software for release, due to circumstances beyond eSource's control it is possible that a limited release occurs or a functioning operational Platform may not be created at all.

Risks associated with use of software within the Platform
Despite eSource's best efforts to develop and maintain the Platform, it is still possible that the Platform will experience malfunctions or otherwise fail to be adequately developed or maintained, which may negatively impact eSource Platform and token, and the potential utility of the token, including the utility of the token for obtaining services and/or offering rewards and/or being used in the manner intended at the time of the Token Sale, causing the value of the token to fall. The eSource Platform relies on software and other technology which may malfunction and/or work in a manner that is not intended, resulting in loss of token and/or access to the eSource Platform.

Risks associated with hardware (Home Hub)
eSource intends to integrate the Home Hub (HH) with the Platform, using the HH to provide measurement, monitoring, and control capabilities to facilitate peer-to-peer trading. In the event the hardware malfunctions (for example, through inaccurate electricity readings, intentional tampering to change electricity readings, or complete hardware failure), this could impact the reliability and credibility of the platform. This may result in lower utilisation of the Platform, and may adversely impact the value of the token. eSource intends to ensure TP compatibility with other hardware devices (for example, smart meters) which should mitigate the adverse impact of HH malfunctioning.

Risk of insufficient interest in the platform
It is possible that the Platform will not be used by a large number of businesses, individuals, and other organisations and that there will be limited public interest in the use of tokens for peer-to-peer energy trading. Such a lack of interest could impact the development of the Platform for release.

A lack of prosumers could result in low supply of electricity through the platform, which may result in higher trading prices. A lack of consumers could result in low demand of electricity, which may result in lower trading price. Both scenarios could reduce the financial incentive for a group of users to participate on the Platform, and may adversely impact demand for, and the value of, tokens.

eSource cannot predict the success of its own marketing efforts or the efforts of other third parties. It is possible that, due to any number of reasons, including without limitation, the failure of business relationships or marketing strategies, that the Platform and all subsequent marketing of the sale of tokens from eSource may fail to achieve success, and this could damage the value of tokens.

Risks associated with changes in market trends
The Platform is a new product, thus contributing to price volatility that could adversely affect the value of tokens. There are many factors affecting the further development of the cryptographic token industry, as discussed throughout this section. These risks can include, but are not limited to, changes in consumer demographics, public tastes and preferences; general economic conditions; and the regulatory environment relating to the Platform, tokens and other tokens.

Risk associated with changes in market competition
The proposed value of the TP is in part reliant on the cost differences between prices received by prosumers in selling electricity to the grid, and the prices paid by consumers when purchasing electricity from traditional suppliers. If energy

suppliers reduce their prices, offering lower and more competitive rates, then the economic value of purchasing electricity through the TP will be diminished. Similarly, if regulation increases the feed-in-tariff or similar payments to consumers, then the benefit and value of the TP will be diminished. These changes could result in lower utilisation of the Platform, risking shut down of the Platform if long-run system costs cannot be covered.

Risk of alternative platforms

It is possible that alternative platforms could be established that utilize the same open source code and protocol underlying the Platform and attempt to facilitate services that are materially similar to those intended to be delivered through the Platform. The Platform may be in competition with these alternative platforms, which could negatively impact the Platform and tokens.

It is possible that a competing cryptographic token other than tokens could have features that make it more desirable to the cryptographic token user base, resulting in a reduction in demand for tokens, which could have a negative impact on the use and price of tokens generally. It is possible that a comparable product could become more popular due to either a perceived or exposed shortcoming of the Platform that is not immediately addressed by eSource, or a perceived advantage of a comparable product that includes features not incorporated into the Platform. If this product obtains significant market share, it could have a negative impact on the demand for, and price of tokens.

Risks of mining attacks, hacking, cyber threats and security weaknesses

As with other decentralized cryptographic tokens based on the Ethereum ERC-20 protocol, tokens are susceptible to attacks by miners in the course of validating token transactions on the Ethereum blockchain, including, but not limited to, double-spend attacks, majority mining power attacks, selfish-mining attacks and race condition attacks. Any successful attacks present a risk to the Platform and Tokens, including, but not limited to, accurate execution, recording of transactions involving tokens and expected proper payment operations.

Hackers, individuals, other malicious groups or organizations may attempt to interfere with the Platform or tokens in a variety of ways, including, but not limited to, malware attacks, denial of service attacks, consensus-based attacks, Sybil attacks, smurfing and spoofing. As the Platform is based on open-source software, there is a risk that any party may intentionally, through the actions set out above, or unintentionally introduce weaknesses into the core infrastructure of the Platform, which could negatively affect the Platform and the value of tokens.

Risk of incompatible wallet service

The wallet or wallet service provider users select to receive tokens into must conform to the ERC-20 token standard in order to be technically compatible with our token. The failure to ensure such conformity may have the result that you will not gain access to your token.

Risk of exchanges

Cryptocurrency exchanges on which tokens may trade may be relatively new and largely unregulated and therefore may be more exposed to fraud and failure than established regulated exchanges. If the cryptocurrency exchanges representing a substantial portion of the volume in token trading are involved in fraud or experience security failures or other operational issues, this may result in a reduction in the price and can adversely affect the value of tokens. A lack of stability in the cryptocurrency exchanges and the closure or temporary shutdown of cryptocurrency exchanges due to fraud, business failure, hackers or malware, or government-mandated regulation may reduce confidence in the Platform, result in greater volatility in the price of tokens and harm the value of tokens.

Risks associated with markets for tokens

The Company may choose not to facilitate any secondary speculative trading or any such external valuation of tokens. Furthermore, to the extent that any third party ascribes an external exchange value to tokens (e.g. as denominated in a crypto or fiat currency), such value may be extremely volatile and diminish to zero.

Tokens are not offered by the Company or its affiliates on an investment basis, and cannot guarantee token value will increase with time.

Risk of uninsured and transaction losses

Unlike cash reserves held in bank accounts or accounts at some other financial institutions, tokens are uninsured unless you specifically obtain private insurance to insure those held by you. In the event of loss or loss of utility value, there is no public insurer or private insurance arranged by eSource to offer recourse to you. Token transactions are irrevocable. If tokens are stolen or incorrectly transferred, such transfer may be irreversible. Cryptographic token transactions are not reversible without the consent and active participation of the recipient of the transaction or, in theory, control or consent of a majority of the processing power on the host blockchain platform. Once a transaction has been verified and

recorded in a datablock that is added to the blockchain, an incorrect transfer of a token or a theft of a token generally will not be reversible and there may be no compensation for any such transfer or theft. Such loss cause individual token holders to lose their tokens.

Further, any incorrectly executed token transactions could adversely affect the value of tokens if, for example, confidence in tokens diminishes as a result of lost tokens.

Risk associated with private key(s)
Tokens may be stored in a wallet or vault. The wallet will hold a private key, or a combination of private keys, required to control and dispose of the tokens stored in your digital wallet or vault. Any loss of requisite private key(s) associated with your digital wallet or vault storing tokens will result in loss of such tokens. Without an accurate record of the private key or password used to access the private key, this may lead to the loss of tokens.

Any third party that gains access to a private key may be able to gain access to a user's tokens. The loss, destruction, loss of access or data loss relating to a private key, may be irreversible and could adversely affect the value of the Platform and overall tokens.

Risks associated with the Ethereum protocol
As eSource and the Platform are based on cryptocurrency protocols, any malfunction, unexpected functioning, forking, breakdown or abandonment of the Ethereum protocol may have a material adverse effect on the Platform or token,, including, but not limited to, impacting your ability to transfer or securely hold tokens. Such impact could adversely affect the value of token.

The Smart Contract System concept, the underlying software application and software platform (i.e. the Ethereum blockchain) is still in an early development stage and unproven. There is no warranty or assurance that the process for creating tokens will be uninterrupted or error-free and therefore there is an inherent risk that the software could contain defects, weaknesses, vulnerabilities, viruses or bugs causing, inter alia, the complete loss of contributions and/or tokens.
Further, advances in cryptography, or technical advances such as the development of quantum computing, could present risks to tokens and the Platform by rendering ineffective the cryptographic consensus mechanism, that underpins the Ethereum protocols.

Risk of an unfavourable fluctuation of Ether and other currency value
eSource intends to use the contributions received to fund the development of the token, eSource Platform and various other operating expenses. The contributions received will be denominated in ETH, and may be converted into other cryptographic and fiat currencies. If the value of ETH or other currencies fluctuates unfavourably during or after the Contribution Period, the Company may not be able to fund the development of, or may not be able to maintain, eSource Platform in the manner that it intended.

Risk of extreme token price volatility
Tokens are not intended to represent any formal or legally binding investment. Cryptographic tokens that possess value in public markets, such as ETH and BTC, have regularly demonstrated extreme fluctuations in price over short periods of time. Exchanges are independent of and not operated by eSource, therefore use of exchanges is at your own risk and eSource cannot and does not guarantee market liquidity for tokens and therefore there may be periods of time when tokens are difficult to buy or sell.

Additionally, due to different regulatory requirements in different jurisdictions and the inability of citizens of certain countries to open accounts at exchanges located anywhere in the world, the liquidity of tokens may be markedly different in different countries and this would likely be reflected in significant price discrepancies. Many factors may motivate large-scale sales of tokens, which could result in a reduction in the price and adversely affect the value of tokens. Cryptographic tokens such as our token, which are relatively new, are subject to supply and demand forces based upon the desirability of an alternative, decentralised means of transacting, and it is unclear how such supply and demand will be impacted by geopolitical events. Large-scale sales of tokens would result in a reduction in the liquidity of such tokens.

Risks involving cloud storage
eSource uses a decentralised cloud storage service to host the Platform and related applications. The Platform is therefore susceptible to a number of risks related to the storage of data in the cloud. Such data may include large amounts of sensitive and / or proprietary information, which may be compromised in the event of a cyber attack or other malicious activity.
Similarly, the Platform may be interrupted and files may become temporarily unavailable in the event of such an attack or malicious activity. As users can use a variety of hardware and software that may interface with the Platform, there is the risk that the Platform may become unavailable or interrupted, based on a failure of interoperability or an inability to integrate

these third-party systems and devices that eSource does not control with the Platform. The risk that the Platform may face increasing interruptions and additional security vulnerabilities could adversely affect the Platform, and therefore the future utility and value of any tokens. There is also the risk of eSource suffering a data breach and loss of personal data in this way, which could result in legal action against it by individuals, customers or regulators.

Risks arising from taxation
The tax characterization of tokens is uncertain in many jurisdictions. Participants must seek your own tax advice in connection with purchasing tokens, which may result in adverse tax consequences to you, including but not limited to withholding taxes, transfer taxes, value added taxes, income taxes and similar taxes, levies, duties or other charges and tax reporting requirements. Participants bear the sole responsibility for any taxation requirements, in purchasing and holding tokens.

Risk of hard-fork
eSource's Platform will need to go through substantial development works as part of which it may become the subject of significant conceptual, technical and commercial changes before release. As part of the development, an upgrade to tokens may be required (hard-fork of tokens) and these upgrades may mean, if you decide not to participate in such upgrade, that you may no longer be able to use your token and any non-upgraded token may lose its functionality in full.

Financial risks
Even though financial projections for eSource's business have been compiled with the utmost care and attention, there can be no assurance that such projections will be achieved. The actual financial outcome is dependent on future assumptions coming to fruition and could be materially different from the projections. Other factors such as competition and costs associated with eSource's operation could have a significant impact on its financial results. This may undermine public confidence in the Platform, resulting in fewer users and lower token value. Extreme financial difficulties may result in dissolution of the Company and the inability to continue development of the Platform.

Through a strong system of corporate governance and risk management policies and procedures including dynamic financial simulations to rapidly changing environments, together with prudent investment policies, the company minimises these risks.

Risks arising from lack of governance rights
As ownership of the token confers no governance rights of any kind with respect to the Platform, all decisions involving the Platform will be made by eSource at its sole discretion, including, but not limited to, decisions to discontinue the Platform, to create and sell more tokens for use in the Platform, or to sell or liquidate eSource. These decisions could adversely affect the Platform and any tokens you hold. eSource expects to use the proceeds of the Token Sale to continue its business and the development of the Platform, but this may not be the case in the future.

Risk to change of token design/use
eSource holds the right to change, modify and hard fork the token into a format that it feels is best for the company and/or future of the token. This could mean adding a new mining function to incentive rollout or changing the structure of the token completely and how it is used, utilised or other. The company needs this flexibility due to the lack of firm rules in regulation and a continued learning of the company and changing of the industry. This could include adding future innovative tools that may not yet be built or just known to the team in the market that might help shape the future of the token.

Risk of intellectual property rights claims
Intellectual property rights claims may adversely affect eSource and operation of the Platform. Third parties may assert intellectual property ownership claims relating to hardware (HH), or the holding and transfer of cryptographic tokens and their source code. Regardless of the merit of any intellectual property claim or other legal action, any threatened action that reduces confidence in the Platform's long-term viability or the ability of end-users to hold and transfer tokens, may adversely affect the value of tokens. Additionally, a meritorious intellectual property claim could prevent you from accessing the Platform, holding or transferring your tokens.

At present, eSource has no reason to believe any such claims are likely to be brought against it.

Risk of dissolution of the Company or network
The creation and issue of tokens and the development of the Platform may be abandoned for a number of reasons, including any of the risks described in this section of the whitepaper. Under such circumstances, the Platform may no longer be viable to operate, and eSource may dissolve and may not be able to continue the development of the Platform. There is no assurance that, even if any such Platform is partially or fully developed and launched, you will receive any benefits through tokens that you hold, and the value of the tokens may reduce to zero.