NEOKII

NEOKII - A Decentralised Energy Information Platform

Introductory Whitepaper

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NEOKII is powered by shine - easyOptimize GmbH

A decentralised, democratised, and decarbonised energy system will enable access to fair, affordable, and clean energy for all. However, significant investments into decentralised and small scale energy resources are necessary to get there.

We aim to empower energy data owners to make use of their data in an encrypted way without losing control over it. We aim to unlock energy data to build a democratised energy intelligence as basis for sophisticated investment decisions and a future energy market design.

shine builds NEOKII, the Decentralised Energy Information Platform.

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INTRODUCTION

ACCELERATE THE ENERGY TRANSITION

The energy demand and supply is one of the key challenges to the global developments in the 21st century. While the demand for electricity will double by 2060[1], we have to reduce CO2 emissions dramatically to limit global warming to below 2°C compared to pre-industrial levels.[2] Our limit to using oil, gas and other fossil fuels is thus not limited by the available resources, but much rather that soon we will not be able to burn it anymore without making our planet uninhabitable.

Recent developments in renewable energy production technology have opened up a possibility to manage this drastic change. Prices for solar production and storage have declined by over 75% in the past ten years[3] respectively over 45% in the last five years[4] and are continuing to fall. The amount of power plants in Germany alone has risen from a few hundred that provided for the whole country to over 1.5m decentral power production units[5]. Whilst technology already exists and the most obvious large scale sites for wind and solar plants have been utilised, the main bottleneck for achieving a truly decarbonised energy system remains: lack of information and too much complexity.

Even though all data is theoretically available, no comprehensive overview of the resources for renewable energy production exists. So as the supply side is not explored and analysed, the same applies to the demand side. There is only fragmented and incomplete data on how much energy is needed when and where. Especially the latter was fine in the old times, when energy was centrally produced by burning fossil fuels and then distributed via powerful grids to where ever it was needed.

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[1] World Energy Council (2016): World Energy Scenarios,
https://www.worldenergy.org/wp-content/uploads/2016/10/World-Energy-Scenarios-2016_Full-Report.pdf

[2] Only about 720 Gt CO2 between 2018 and 2100 should emit into the atmosphere if global warming shall be limited to 2°C: https://www.mcc-berlin.net/en/research/co2-budget.html. In 2016 the global CO2 emissions alone added up to 35 Gt: https://de.statista.com/statistik/daten/studie/37187/umfrage/der-weltweite-co2-ausstoss-seit-1751/

[3] Fraunhofer ISE, "Aktuelle Fakten zur Photovoltaik in Deutschland" (2017):
https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/aktuelle-fakten-zur-photovoltaik-in-deutschland.pdf

[4] Institut für Stromrichtertechnik und Elektrische Antriebe der RWTH Aachen, (2017):
"https://www.speichermonitoring.de/fileadmin/user_upload/Speichermonitoring_Jahresbericht_2017_ISEA_RWTH_Aachen.pdf"

[5] Agora Energiewende (2017): Energiewende und Dezentralität. Zu den Grundlagen einer politisierten Debatte.https://www.agora-energiewende.de/fileadmin2/Projekte/2016/Dezentralitaet/Agora_Dezentralitaet_WEB.pdf

If you subscribe to the hypothesis of rising energy demand, whilst fossil fuels are no longer usable, this lack of information becomes the crucial point in our global energy future. When investments of trillions of dollars are necessary over less than 50 years[6], it is decisive to have very accurate and dynamic information on when and where to invest. A well organised and accessible data treasure is most likely of similar value in the 21st century than access to vast deposits of oil and gas was in the last one.

At shine we believe that such a vital asset for the survival of our planet should not be owned by any single entity, nation or person, but much rather should belong to everyone. Cryptoeconomics provides us with a set of features to incentivise both the creation and the distribution of necessary information.

We aim to incentivise companies and private individuals to contribute their information by supplying them with NEOKII tokens (KII). The value of these tokens derives directly from the value that infrastructure investors, utilities and grid operators will attribute to such information. Giving the development set out above, this attribution is only to rise in the future, ensuring a positive development of the token value and increasing the incentive to contribute information fast.

With shine we have successfully developed the starting motor for this approach over the last years in the operating business of easyOptimize GmbH in Berlin. Through its energy management technology we have analysed and ascertained which data to collect and how to utilise it.

This knowledge and our technology we want to use to start NEOKII - the Decentralised Energy Information Platform, that will fully change how we think about, produce and use energy.

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[6] https://unfccc.int/news/private-investments-are-crucial-to-achieve-paris-goals

THIS IS SHINE

shine is the brand of the renowned, 2015 founded and Berlin based easyOptimize GmbH. The company has developed and offers energy management solutions to optimise the energy usage of consumers and prosumers. In addition to that it has developed algorithms and solutions that help them on the way to become energy producers by recommending and implementing the acquisition of an energy producing asset (i.e. solar power).

The German energy transition has shown that it is possible to bring the percentage of renewable power from 23,5% (2012) to over 36,2% (2017) within just a few years.[7] The truly amazing thing here, however, is that this has all happened almost fully without using the most obvious means of producing energy: private and public buildings, existing roof spaces and the basements and utility rooms of every household. If energy is produced at the location where it is demanded, then the need for building new power lines, transformator stations and complex trading mechanism is vastly reduced.

shine builds upon this, both with its proprietary and patented energy management and optimisation technology, and with building solutions to help everyone to reach their own energy transition faster and without hassle. In a first step we have developed algorithms, hardware and software that enable households and businesses that already produce their own power, using micro combined heat and power or solar technologies, to produce and use more of their own produced energy in a more efficient and cost-effective way. Whilst we were constantly improving our technology, we have added tools that are useful for every household in Germany to have the best power provider chosen for it and to aid each household in its choice as to invest into a decentral power production system or energy storage, alone or within a community. These activities directly provide real time data and information to improve the accuracy and validity of models and deductions.

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[7] https://www.umweltbundesamt.de/themen/klima-energie/erneuerbare-energien/erneuerbare-energien-in-zahlen #textpart-1

TEAM SHINE: 80+ YEARS EXPERIENCE IN ENERGY, TECH, AND DATA ANALYSIS

Dr. Felix Grolman, CEO: 20+ years experience | innovation entrepreneur, investor and advisor for renewable energy and the digital economy | previously held positions with Freshfields Bruckhaus Deringer and Morgan Stanley in London and with the Boston Consulting Group, before establishing his own companies within the renewable energy space such as the renewable energy utility and direct marketing player Grundgrün | he also invests into and serves on the board of several young digital startups

Christian Rietz, Co-Founder NEOKII: 10+ years experience | enthusiastic about the potential of intelligent systems to build future economies | previously built powerful networks for startups in the field of energy and blockchain at Bitkom after co-founded Berlin based feedback software startup first fox in space | exploring the deep rabbit holes of crypto economics since 2015

Daniel Adad, CTO: 30+ years experience in technology and innovation | energy, telecommunications, IT infrastructure, pharma | held top management positions at successful digital international startups like Toptarif (CPO), Global Leads Group (CIO), froodies (CTO), Fox Mobile Group (Operations) | founder, CEO and investor at Wogic, ADX2 Binarios

Paul van Weerdenburg, Head of Product & Business Development: 12+ years experience in the world of energy | Essent Energy Trading at RWE Supply & Trading and Innogy | Energy Trading, Portfolio Management, Commercial Asset Management & Venture Developer at Innogy Innovation Hub

Rene Meyer, Head of Finance & HR: +15 years extensive experience in start-up finances and controlling, due diligence processes and reporting | 12 years with SkySails in different roles | degree in Economics and MBA from the University of Bradford | passionate about the transition towards a circular economy based on decentralised energy

PROBLEM

Heading to a decentralised, decarbonised, and resilient energy future developments have got stuck in an investment backlog. After massive investments into large scale renewable energy within the last years, significant capital spendings into decentralised and small scale energy infrastructure are strongly needed.

Without information investments become impossible. And, the more underlying data is available, the more sophisticated are the investment decisions. There is a plethora of energy data out there – data in silos of energy companies, consumer households as well as different open data. This locked energy data is massively under-utilised.

Moreover we see a strong restraint against sharing this data at the moment - first and foremost for privacy concerns.

MISSION STATEMENT

A decentralised, democratised, and decarbonised energy system will enable access to fair, affordable, and clean energy for all. However, significant investments into decentralised and small scale energy resources are necessary to get there.

We aim to empower energy data owners to make use of their data in an encrypted way without losing control over it. We aim to unlock energy data to build a democratised energy intelligence as a basis for sophisticated investment decisions and a future energy market design.

MOTIVATION

Let's shape the future of energy. Together. We are banking on a future in which solar will be everywhere, and everything will be electrified in a fully digital world. The power delivery will be completely automated and without margins. We imagine a world where everyone is enabled to their own energy transition fueled by access to their best possible energy solution at any given time. Whether it is a PV installation on the roof or a micro combined heat and power

in the basement, any other renewable energy asset or the orchestration of the household's energy flows.

We strongly believe that it is possible to strike a balance between the well-being of people and economic growth. With our commitment to five Sustainable Development Goals we want to contribute to foster both.

Moreover, according to the Sustainable Energy Goals set by the UN[8] we fully intend to enable access to affordable and clean energy for all. We strive for a nearly full transition to decentral and CO_2 neutral energy sources. We not only aim for an increased share of renewable energy in the global energy mix. We seek for a future of 100% renewables, a future with energy that is unlimited and free, almost always and everywhere.

Our role is not only to put consumers in the driver's seat of their personal energy transition. We want to enable electric utilities, grid operators and other investors to make sophisticated decisions to invest in renewables. We envision a data basis for a future energy market design. Together with a community of innovators we want to give energy market builders the required modeling tools to understand future energy markets. Let's build a future with new energy service providers and established ones empowered for new roles in a decentralised world.

The arising developments of Blockchain have led to powerful new features to incentivise people[9] to be part of the common good of decentralised energy. Through cryptoeconomics billions of people can access new ideas and markets, become part of new networks and build truly open source systems. We want to

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[8] https://www.un.org/sustainabledevelopment/energy/

[9] Trent McConaghy on Blockchains as incentive machines:
https://blog.oceanprotocol.com/can-blockchains-go-rogue-5134300ce790

build a community of people sharing our vision, we invite and incentivise global energy data owners to become part of our vision. We reward them with programmable incentives, with intrinsic tokens in exchange for their contributions.

Actionable intelligence based on high-quality energy data enables sophisticated investment decisions (e.g. more reliable forecasts for yields from PV systems) and leads to enhanced recommendations, reduces the drivers of complexity and uncertainty to bring the energy transition to people's home. There is plenty of energy data out there – data locked in silos of energy companies, consumers' data and different energy open data. We see a big need to bring together and harness this data. With modern artificial intelligence (AI) it is possible to extract value from data. The more data is available the more accurate are the AI models. In the end this turns out to mean more sophisticated investment decisions for renewables.

To attract the best energy data globally and unlock them for AI we build NEOKII - the Decentralised Energy Information Platform.

DECENTRALISED ENERGY INFORMATION PLATFORM (DEIP)

OVERVIEW

shine's vision is to bring the energy transition home - directly as trusted energy companion for consumers. With NEOKII we build upon a data basis for a future energy market design. A basis for electric utilities, grid operators, other investors as well as individuals to make sophisticated investment decisions for decentralised energy resources.
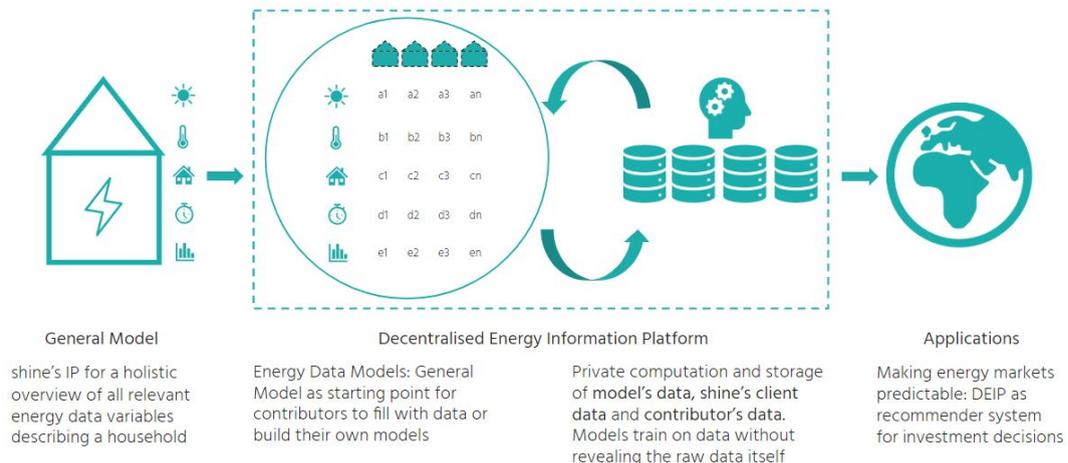
We introduce the Decentralised Energy Information Platform to bring together and harness the energy data out there. It's our main concern to democratise energy intelligence through responsibly liberating data. To attract the best energy data globally and unlock it for AI the DEIP will be tokenised. We will introduce KII, a cryptographic intrinsic token on the Ethereum blockchain for our participatory ecosystem contributors. KII acts as fuel to incentivise the disparate energy stakeholders to join our vision and bootstrap the DEIP.

The DEIP will be created upon our own encrypted client data combined with open energy data ("commons") and data provided by our community

contributors as fuel for actionable intelligence. In a first step we define variables of energy data and their relations to get a holistic overview of all relevant energy parameters describing a household. We then build a holistic model by statistical analysis and grading of this energy data, like household's energy consumption, asset performance or condition of a building. This general model is enriched by relevant open data and estimated data like the size of households. After transforming the model into a decentralised database structure we fuel the model with real time client data and open it for external contributors like data providers and data modelers. In further consequence algorithms learn from the data, train the general model to finally make accurate predictions achievable as basis for decentralised energy investment decisions.

KEY ELEMENTS

The DEIP can be rated as an interface for the ecosystem contributors and is supposed to be the one-stop shop for both energy data and energy model consumers. Armed with its own incentive scheme the DEIP will be built on top of a protocol layer from our infrastructure partner. The platform's progress will be made alongside four key elements: *General Model, Energy Data Models, Private Computation and Storage, Applications.*

General Model	Decentralised Energy Information Platform		Applications
shine's IP for a holistic overview of all relevant energy data variables describing a household	Energy Data Models: General Model as starting point for contributors to fill with data or build their own models	Private computation and storage of model's data, shine's client data and contributor's data. Models train on data without revealing the raw data itself	Making energy markets predictable: DEIP as recommender system for investment decisions

GENERAL MODEL

shine brings its up and running energy management product and customer relations into play. As the foundation for the Decentralised Energy Information Platform, shine contributes its competencies in form of a general model that enables a holistic overview of relevant data variables and their relations to describe buildings in terms of energy information. In further progress this model will contain data points from shine's energy management technologies for

consumers, pre-prosumers and prosumers combined with relevant open data like building or weather data. The general model can be used as a toolkit, as an open framework for further usage or model contributions. It can create value in different areas of use. Efficiency calculations demonstrate whether it is worthwhile to produce energy by means of photovoltaic or CHP and show the saved costs, the degree of energy independence and the contribution to climate protection.

ENERGY DATA MODELS

shine's general model lays the foundation for any imaginable energy models e.g. to describe different geographical units concerning sophisticated investment decisions for renewables. The framework of the general model is intended to be a toolkit for contributors to fill with energy data as well as starting point for data modelers to build their own models. To be as accurate as possible all these models need more data by all available means.

PRIVATE COMPUTATION AND STORAGE

Not only because the platform touches the home as one of the most sensitive areas of everyone's life, a major necessity when sharing data is privacy. Our main goal building the DEIP is to enable inalienable control of personal data. People are allowed to submit private data about their behaviours at home. Energy companies are empowered to share their data gathered from customer relations. On another note privacy prevents the economic value of the data and models from leaking.

Privacy concerns lead to the need of secure computation. It is essential that models train on data without revealing the raw data itself. No machine learning algorithms shall ever see the decrypted original data. We will present the Decentralised Energy Information Platform on top of an underlying decentralised technology for storage and computation that guarantees both privacy and scalability. Since there are active talks with potential partners at the moment we refer the reader for more details to a later version of this paper.

APPLICATIONS

People willing to support the energy transition to a renewable energy future are the key driver for our action. The growing DEIP will be an energy recommender system for investment decisions for renewables - for companies as well as individuals. It makes energy markets more predictable: actionable intelligence based on high-quality energy data leads to enhanced recommendations while

reducing complexity of the fragmented market for renewable assets and therefore uncertainty for those who are searching for the best investment decision. A possible application could be a global energy map as the foundation for predictive energy markets. Other reusable applications on the DEIP are conceivable. Generally the DEIP is a basis for anyone to build applications. In the long run the DEIP shall evolve into a marketplace for energy data models competing for access to contributors' encrypted data to make worthwhile energy recommendations. Contributors get compensated with NEOKII tokens (KII) in return for providing their data and their attention to the recommendations.

CHALLENGES

The main success criteria setting up a decentralised data platform are guaranteed privacy and the capability of scalability. And, of course, the onboarding of the contributors, the community buildup. The first two things are pretty good arguments for the latter, though. It is badly needed that the DEIP contributors maintain control of their data. We also seek secure computation methods that have overcome the problem of slowness and high costs. When it comes to data sharing we will face challenges of value calculating of the provided data. The concept of curation markets could be a starting point.

ECOSYSTEM STAKEHOLDERS AND PLATFORM CONTRIBUTORS

There are several key stakeholders in the DEIP ecosystem and they all play a vital role for the platform's progress.

DATA PROVIDERS

Data is not only mission-critical for the DEIP - it is the essence of the whole endeavour. On this view data providers are essential actors to the ecosystem. They stake data to the platform and make their data assets available for modelers. There is no prescribed format for the data. Providers of energy data can have different profiles. Consumers act as data owners and provide their household energy use and behavioural patterns in exchange for NEOKII tokens (KII). Energy companies, e.g. utilities and grid operators act as data custodians. They hold data on behalf of their customers. As key contributors they can provide relevant energy data (e.g. load profiles) from their customer relations without compromising its privacy so that they get reward tokens in return, are

part of a global energy transition, and will be empowered to predict future energy markets. Even autonomous agents could be future data providers, too.[10] As it is our main goal to bring together and harness energy data and conceive it as substrate for a collective artificial intelligence, we think of other potential data providers like other decentralised networks, e.g. in the IoT space.

The onboarding of data providers is key to the platform's success. Besides the first major contribution of our client data to the general model we integrate early key contributors like electric utilities to the platform. Later on we aim to integrate other decentralised networks gathering relevant energy data. Details on how to contribute data assets are being defined with our infrastructure partner.

DATA REFINER AND VALIDATORS

As it is proposed that there is no prescribed format for the data there might be a need for refining the provided data. Data refiner and validators add value to the DEIP by performing micro tasks like data cleansing, transformation and validating across multiple sets of energy data. The resulting refined sets will be handled as unique energy data assets. They get rewarded with NEOKII tokens (KII) in return. We go for an early onboarding of external data scientists acting as data refiner and validator. Generally data scientists can act as both modelers and refiner.

DATA MODELERS

Data modelers are core actors on the platform. They can rely on shine's general model ("toolkit") and choose what data to use to enhance the model. Modelers can also choose what data to use and build their own models from scratch. The models are trained by using a secure computation method provided by our partner for the platform's underlying technology. Models are staked as well so data modelers get rewarded with NEOKII tokens (KII). Data scientists acting as data modelers should have early access to build upon the general model.

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[10] See for example Fetch's proposal for a decentralised digital world for the future economy:
https://fetch.ai/technical-introduction

DATA CONSUMERS

Data consumers embody the demand side of the DEIP. The consumption of energy data assets and energy models on the DEIP is open to everyone whether individual or any type of organisation. Data consumers access offered data assets including data sets and models or applications like the global energy map as a basis for their decision making. Details on how to access data assets are being defined with our infrastructure partner.

NEOKII TOKEN (KII)

The KII token is an integral part of the DEIP that incentivises the disparate energy stakeholders to join our vision. They are intended to provide access to the services of the Decentralised Energy Information Platform, to be the means of transacting within the platform. Not merely we keep an eye on the discourse about security and utility dimensions of tokens we will seek talks with regulators early on.

We strive for all energy data to be tokenised. DEIP users have to acquire KII to join the platform as a data provider, modeler, refiner, validator, or consumer. The tokens can be received by taking part in the token generating event, purchased via external crypto exchanges, or by offering value-added services within the platform. KII is needed by data providers when they stake their data assets and by data modelers when they stake their models. Data refiners and validators provide data cleansing and transformation in exchange for KII.

The NEOKII token will be deployed as an ERC20 token on the Ethereum platform with a limited supply. To start the engine and scale to a wider scope we like to invite energy companies with large data assets as well as energy data science communities to join our mission and the DEIP as early contributors. First buyer advantages will lead to an overproportional benefit of the intended network effects as well as preferred access to the platform's outcomes.

Since we are experiencing a fulminant pace of innovation in the crypto ecosystem we will continuously drill down to find the optimal token sale model aligning incentives between every involved actor. Details on the token economics and launch will be provided in a separate paper later on.

CALL FOR COLLABORATION

The main purpose of this paper is to introduce our approach for a decentralised, democratised, and decarbonised energy future. We are still at early stage and in exploring mode for the optimal information sharing and token model.

As we all know that breaking the bottlenecks to make our vision come true is a herculean task, we have to pool forces. With this in mind we want NEOKII to be open and transparent. We highly recommend your feedback and invite you to join our mission to unlock energy data as a basis for a new energy market design.

There are large amounts of energy data out there, though no comprehensive overview of the resources for renewable energy production exists. Both the supply and demand side has not been deeply explored and analysed yet. There is only fragmented and incomplete data on how much energy is needed when and where.

Join NEOKII as an early contributor to change this and become an integral part of the Decentralised Energy Information Platform. Join the tokenised platform and participate in the intended network effects. Come on board if you are an energy data owner or if you hold data on behalf of your customers. Stake your data assets like consumption data or performance data of distributed energy resources to the platform and make it available for data modelers. Come on board if you are a data modeler and like to delve into the ocean of energy data, enhance our general model or build your own. Join NEOKII and contribute in many ways. Join NEOKII and become part of the decentralised energy revolution!

ROADMAP
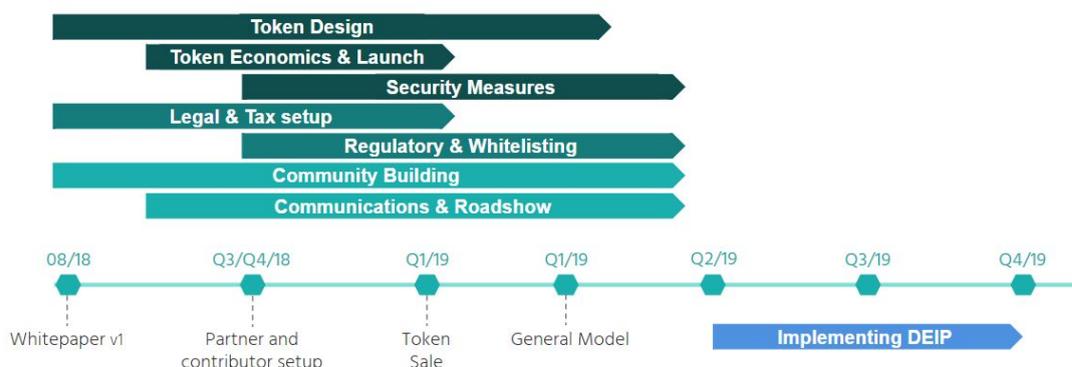
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Land der Ideen

Ausgezeichneter Ort 2017