



SOLARA - Smart Metering on the Blockchain

Clean energy data analytics and asset origination, ownership, and energy-backed smart contract synthetics

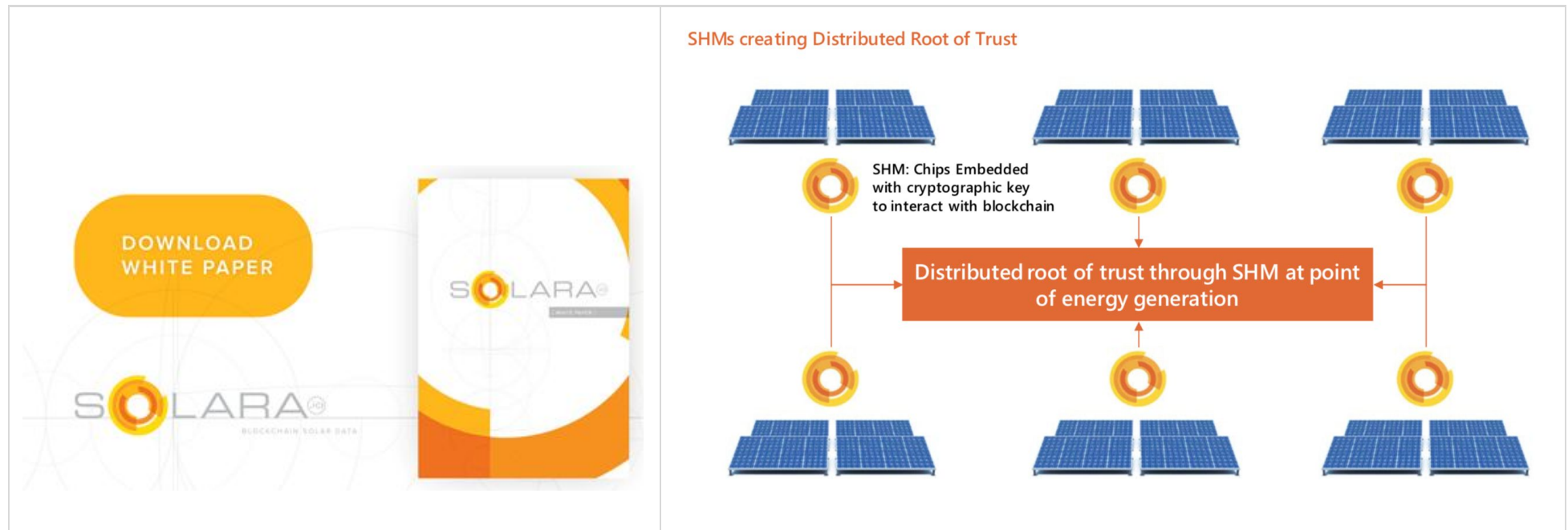


Presented on February 12 & 13 - 2018 by RightsFusion P/L and Solara Ltd, Leon-Gerard Vandenberg, PEng MBA, Chief Technology Officer

LG@RightsFusion.com (refer to Solara.io)

Symposium on Blockchain and Distributed Ledger Technology

<http://blockchain.unsw.edu.au/symposium18/HTML>



Problem:

- Energy consumers and traders have difficulty determining green (renewable) energy from brown (fossil fuel) energy.

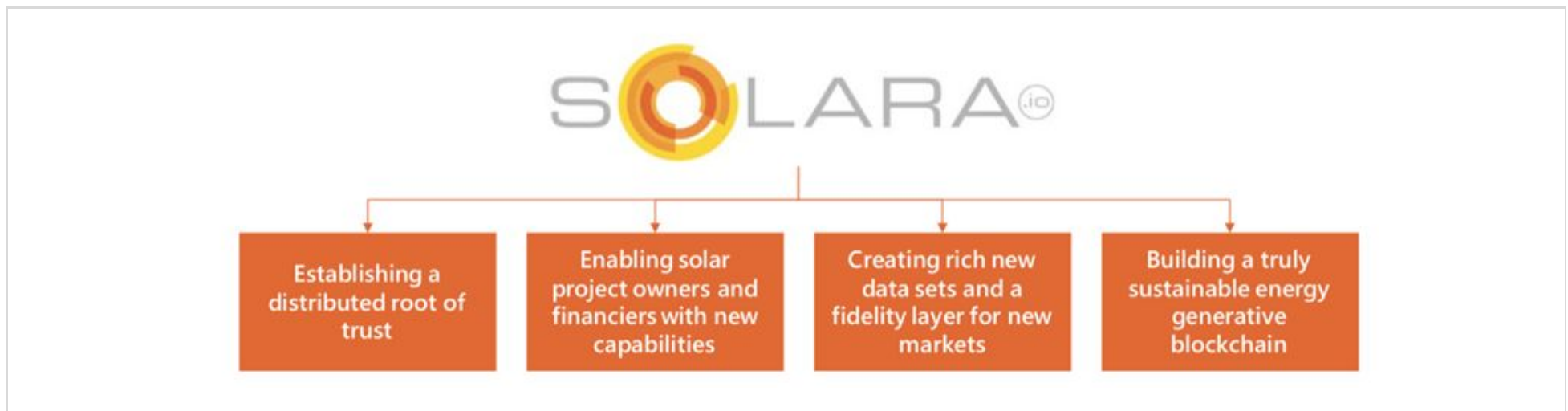
Solution:

- SOLARA allows solar asset owners, solar communities, and producers-consumers ('prosumers') to monetise their energy data. This is accomplished while maintaining privacy of participant - a feature of the zero knowledge proof (ZKP) or zkSnark.

The SOLARA platform and each Solara Hardware Module (SHM) facilitates access to an energy data sensor network with high-resolution production and trading data previously unavailable to consumers or industry. At scale this platform becomes the 'Bloomberg' or 'Reuters' of energy data.

SOLARA advances a new generation of solar panels, inverters, and batteries for micro-grids and solar farms. This advances expansion of the network in developing countries to enable schemes within the rated Climate Bond Initiative (Green Bond) under the United Nations directive.

Consensus framework - the 'ARA - Energy Generative Blockchain'





Executive Summary

Macro	The energy sector is undergoing massive transformation. The rise of distributed generation (such as rooftop solar) and smart networks for peer-to-peer energy trading present new opportunities. Effective data gathering and big-data analytics for clean energy is next.
Market	Professionals rely on the best information available to base business decisions, the SOLARA platform provides just that for the clean energy industry. The addressable and available market includes those in energy generation and network operations. On the investment side, many are looking to benefit from offering alternate ownership and income instruments in energy infrastructure funding and crowdfunding.
Problem	Metering and governance models currently deployed impede peer-to-peer energy trading. Constraints exist for fractionalised ownership and clean energy assets with associated take-offs. In addition, granular trusted data is unavailable for collection in a cost-effective manner.
Causation	Centralised business practices governed by incumbent authorities have resulted in metering equipment without real-time accessibility for customers and stakeholders. Most energy production data is low resolution and held in 'silos', unable to be shared or monetised.
Solution	The solution - trusted accurate smart metering in real-time across a distributed network. Combined with a big data methodology this forms the basis for truly innovative products - where the network is the meter.
Product & Service	<p>The SOLARA Hardware Module (SHM) incorporates a chip with secure keys and encryption at the energy asset (a solar panel or battery for instance). The module transmits encoded data conveying details including ownership, event information, and metering records which are written to a distributed ledger using blockchain technology.</p> <p>The company will generate revenue via:</p> <ul style="list-style-type: none">- Data sales, access to large data sets actually generated by participants, facilitating a 'Bloomberg' style business with 'seat' fees and charges- Hardware registration of SHM's and ongoing operability, paid for in SOL (providing future value for token holders)- Project Asset Tokens (PATs) registered by participants on the platform (paid for using SOL).- Planned capability for PAT registrants to issue subassets, paid for and requiring annual renewal in SOL
Offer	Token Presale - Public Sale - Token Generation Event

Harvesting Sunshine with Smart Solar Panels and Cryptocurrencies

Colin T. Mallett

Founder & CEO, Trusted Renewables Ltd,
Visiting Fellow, University of Hertfordshire UK

Leon-Gerard Vandenberg

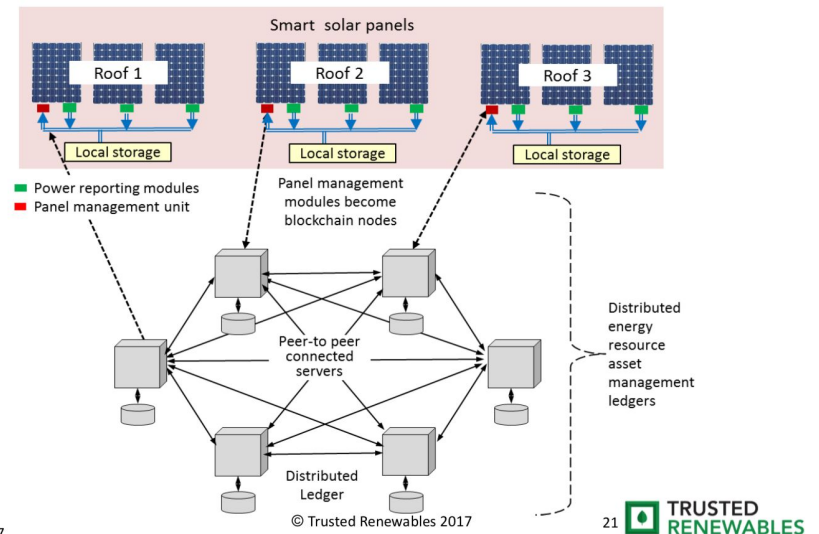
Advisor, Rights Commerce Ltd, Hong Kong
Founder & CTO, Fuzo Limited, Hong Kong

07/02/2017

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Trusted Renewable - Prototypes photovoltaic (PV) panel with Patented Hardware Module



RightsFusion Solara TOSIM -PreZigbee Hardware Module





The 'smart' electricity chain

- Provide a 'smart' metering solution - from Source to Appliance
- Fostering cryptographically-verified smart metering solutions
- Exclusive patented technology and derivative Intellectual Property (IP)
- Products that deliver immediate value to solar farms and clean energy generators

Renewable Energy Asset Exchange

- Develop an exchange for peer-to-peer trading of assets and coupons, secured by distributed consensus in the form of a blockchain
- Provide developer-facing tools to expand the scope and utility of the SOL token, data market tool sets & smart contract models
- Recurrent revenue from registration of PAT tokens, customer platforming, and hardware module sales

Global real-time energy data

- Develop the global platform for energy data collection; hold the rights to valuable data outputs
- Be the primary big data solution for trusted distributed energy - that data being the primary source of future earnings
- Create expanded data sets, increasing the system value as the repository expands
- Spin-off of new data market businesses, research initiatives are fostered, machine learning operations become viable, and analytics services mature
- Evolve these initiatives into a Quant Score on PATs (Project Asset Tokens)

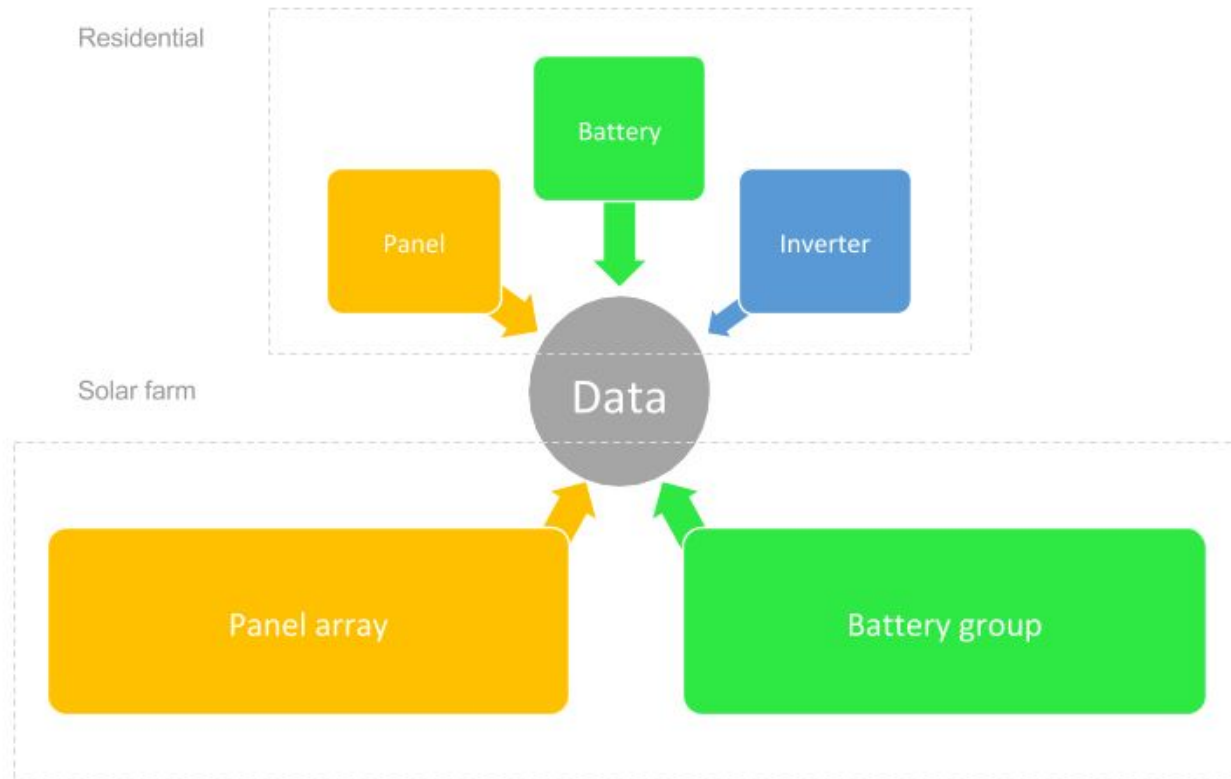
Safe Haven Asset Classes

- A portfolio of PATs could be synthesized to provide an algorithmically traded [Stable Coin](#)
- Crypto traders can deal directly with Security Tokens via an Exchange or Distributed Exchanges such as the [OxProtocol](#) project via [RadarRelay](#)

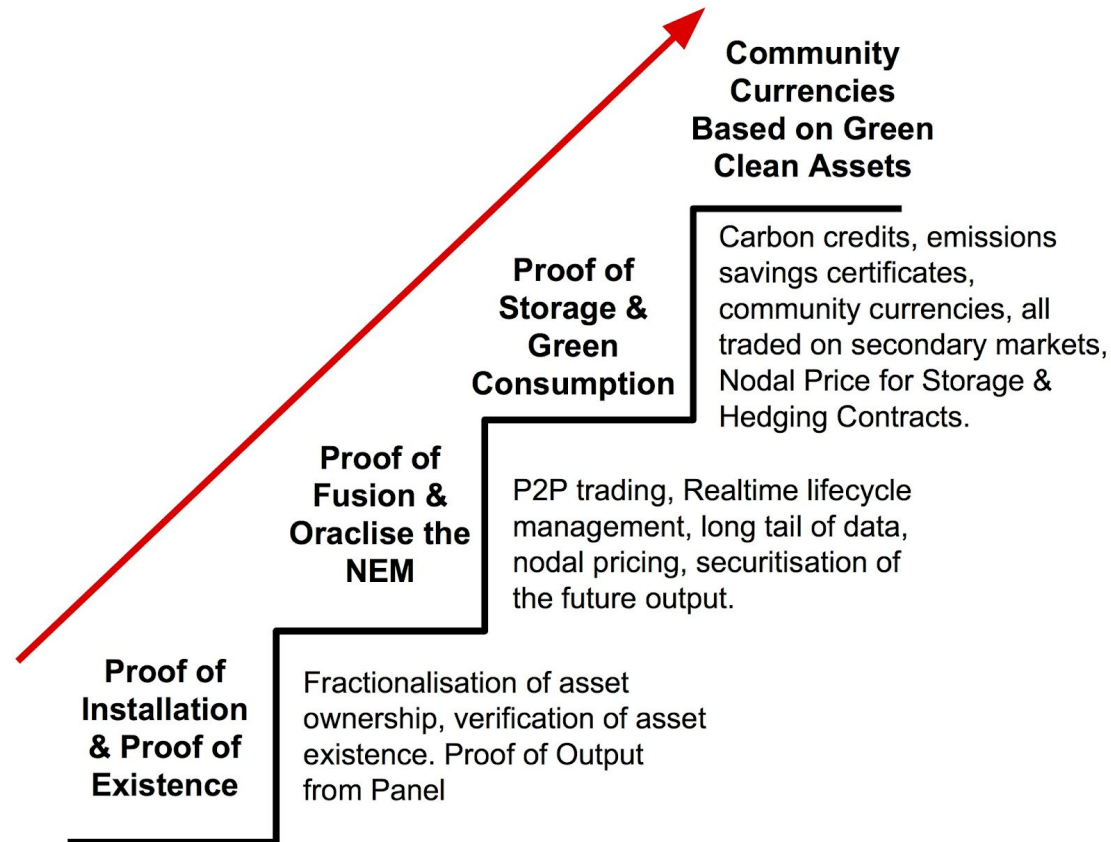
Data Model

Renewable energy data is harvested from many sources:

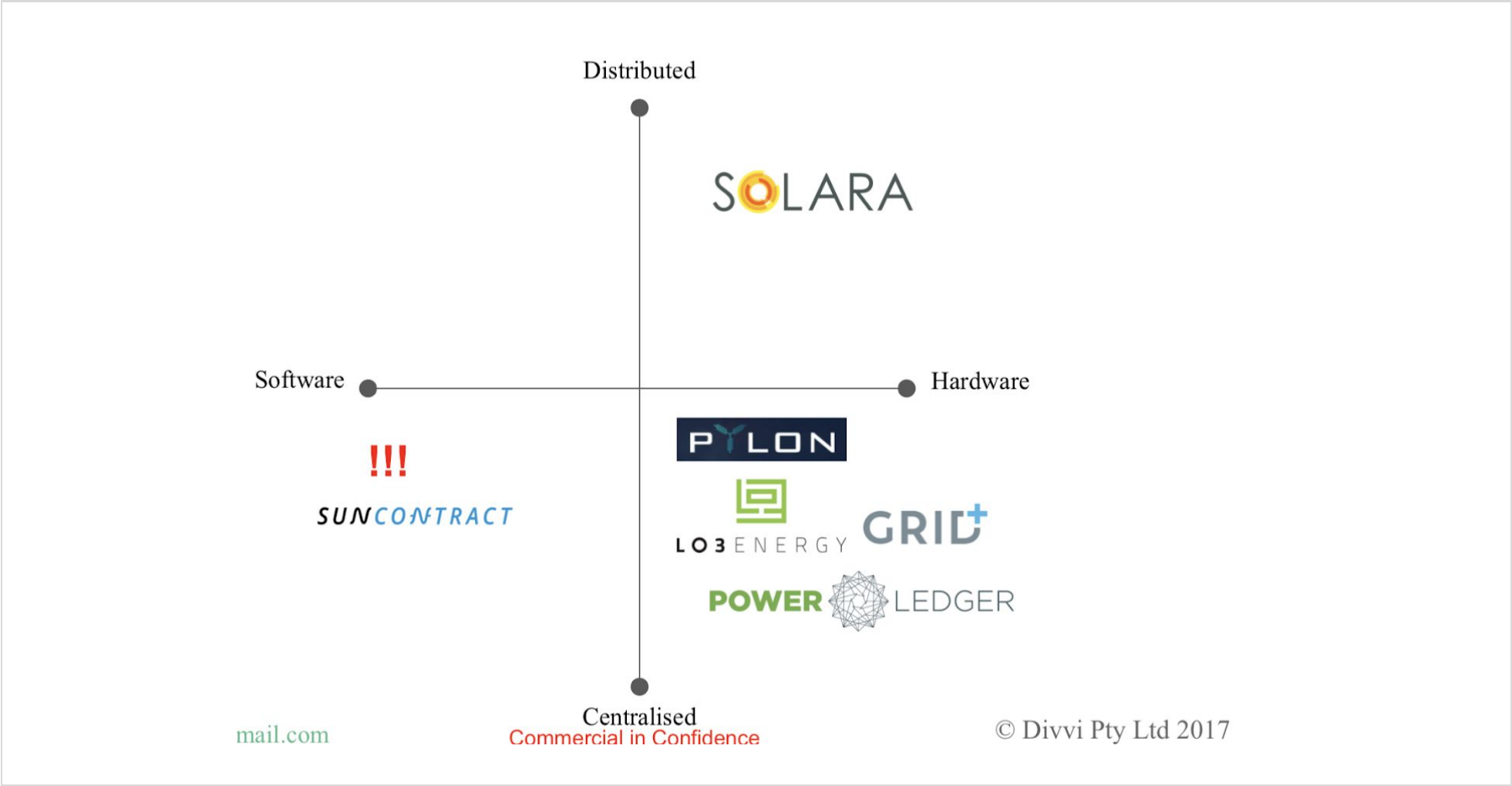
- Photovoltaic solar panels
- Batteries
- Smart Inverters
- Downstream Appliances - using Zigbee Sensors & [Smart Energy Profile 2.0 Spec](#)
- Orchestration of Energy “ Sources & Sinks” - Maximise - Price - Maximise Green Signal
- Industry SCADA interfaces - Community Grids - Smart City Standards



Strategic Staircase - Progressive Steps

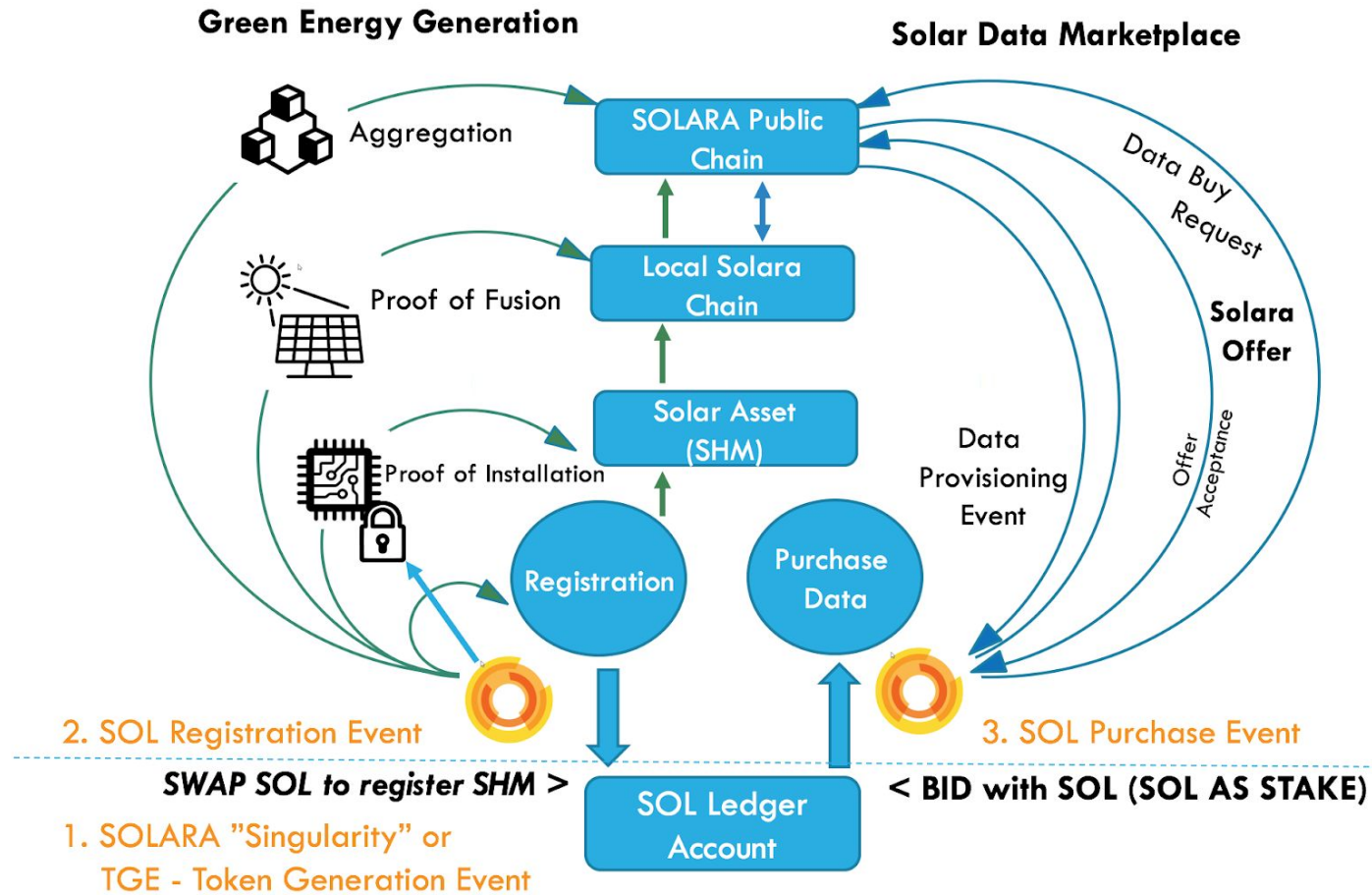


Competitive Comparison Matrix



(IoT based Oracles) - provided by Divvi Pty Ltd

SOLARA CIRCULAR ECOSYSTEM



Tokenisation



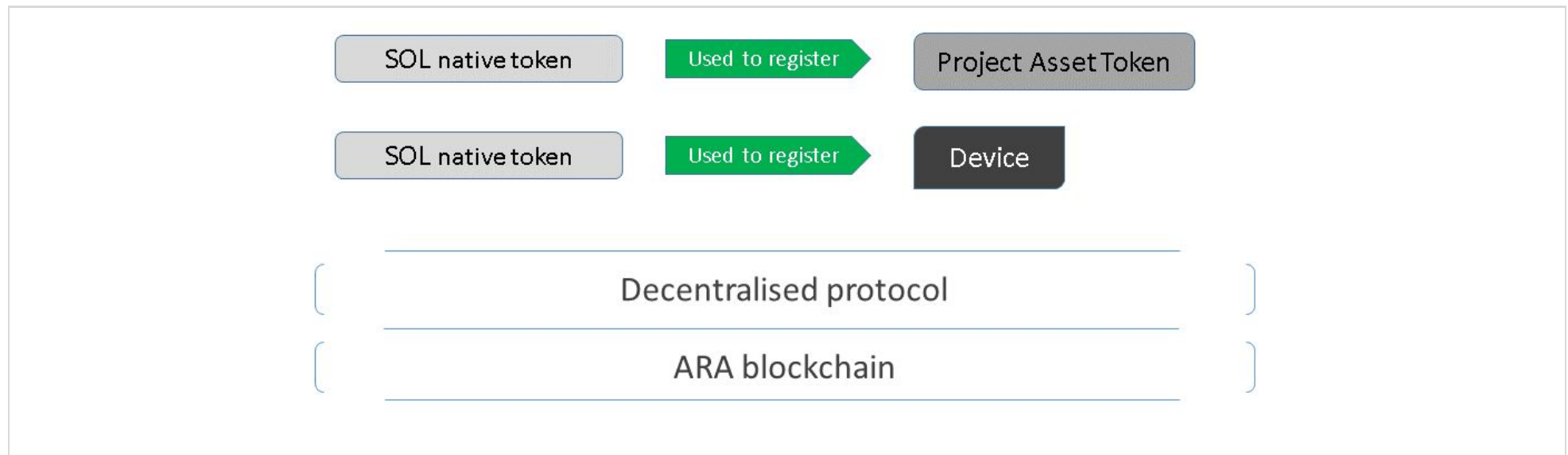
RightsFusion	Has rights to the resale and aggregation of data
	Can conduct comparative & competitive analysis and gain insights unavailable to others unless paying for the data
	Is the most knowledgeable party based on data collection
The SOL token	Enables a secure hardware module on the panel
	Registers acceptance of the data licensing agreement
	Empowers the asset owner to access their operational data
	Is used by entrepreneurs to issue a Project Asset Token (PAT) and optionally subassets of their token
Project Asset Tokens	The PAT and any subassets (until issuance) are entirely owned and issued by the project owner (while registration is maintained)
	Facilitates new funding and offtake distribution models
	Puts the legal responsibility on the project owner for services offered
	Enables event-driven orchestration where (based real time inputs) a 'smart' contract can execute a set output to the blockchain
	Transfers rights as a form of security & coupon payment
	Can operate as a quality rated asset based on verified energy output

About Project Asset Tokens (PATs)

PATs provide technical functionality for companies on the platform. A PAT enables that company (with appropriate regulatory approval) to offer innovative financial products. This is analogous to use of Bloomberg data by financial institutions as the basis for issuing derivative products.

The financing of distinct solar assets becomes available through securitisation of energy outputs using a distributed, trusted and transparent system for executing clean energy smart contracts. Funding and liquidity for project developers becomes available using associated financial synthetic instruments made possible by these new models.

The intrinsic SOL token gives holders the ability to register both Project Asset Tokens and devices (with HSM chips) on the blockchain



Tokens are able to be independently traded by the holder without permission from any other party. Commonly this would be done by:

- Private negotiated sales
- Participation in a smart contract
- Trades entered into by sending tokens to another address
- Offering them for sale on a distributed exchange



Companies dominating big data sectors

Company	Sector
23andme	DNA testing and analysis
Bloomberg	Financial trading information & analytics
Google	Search and advertising analytics
Tableau / TeraData	Data analytics software as a service (SaaS)
Markit Registry	Clean energy & environmental asset registry

Clean energy peer-to-peer trading competitors

ConsenSys	United States based peer-to-peer trading market, various applications at the Proof of Concept stage
Grid Singularity	Austrian start-up with a peer-to-peer trading market at the Proof of Concept stage
Metropolis	Conventional Australian residential, business and commercial electricity smart metering and management solution across the National Electricity Market (NEM) for billing and market payments
Power Ledger	Australian peer-to-peer trading market with various applications at the trial stage

Analogous technical implementations




MyBit	A peer-to-peer investing application, which unlocks billions of dollars in IoT revenue. Ownership of a specific asset is distributed among several investors enabling the crowdfunding of revenue generating IoT assets.
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Comparable token sales in the energy sector include PowerLedger which was quickly traded on three exchanges, and the Grid+ ICO.

Reference

(Electrify.Asia)	Electrify.sg	Energy marketplace
Institute of Electrical and Electronics Engineers	IEEE 2030.5 - Smart Inverter Standard	Industry SCADA interface
Clean Energy Derivatives Company	CEDC.com.au	Structured derivatives contracts
Sunspec Alliance	SunSpec Alliance - Security Working Group	Distributed Energy Resource (DER) deployment

Executive team

	Klaus Selinger <i>Chairman</i>	Klaus is an experienced accountant and senior executive who consults in the financial services on complex projects worldwide and advises banks and financial institutions. Klaus provides strategic advice in the field of private equity investment and has a reputation for implementation and the delivery of optimal outcomes.
	Dr. Karel Nolles <i>Advisor</i>	Karel worked with Macquarie Bank in Energy and Utilities from 2007 to 2013, and was previously an academic - he was a founding director of the UNSW Centre for Energy and Environmental Markets. Karel was seconded from Macquarie in 2012 to be the CEO of the NextGen wholesale electricity brokerage business, and represented Macquarie as a Director on the Boards of several companies. Karel was Head of Market Design at SocietyOne from 2014 to 2016.
	Leon-Gerard Vandenberg <i>CTO & Platform Evangelist</i>	Leon-Gerard graduated with a B.A.Sc. in Systems Engineering from the University of Waterloo in Canada. He is an experienced in driving change and convergence in the delivery of complex technologies within short timeframes. With specific expertise in sensor networks, identity and industry security models Leon-Gerard has a deep understanding of mobile and IoT devices leveraging cloud, AI, and big data.

	Geoff Cairns <i>Advisor</i>	With a B.A. in Economics, Geoff is a senior fintech executive and entrepreneur assisting early stage high tech companies identify and execute winning business, product and revenue strategies.
	Uli Klink <i>Advisor</i>	As previous Managing Director of Giesecke+Devrient Australasia Uli has been at the forefront of new technologies and has an expertise in real time data processing and related security mechanisms. Uli developed secure, distributed authentication systems for a major gaming manufacturer and is an acknowledged SIM expert and consultant.
	Matt Hale <i>Climate Scientist</i>	Matt graduated from UNSW in 2015 with a bachelor of Advanced Science/Arts with Honours in climate science. Matt has worked on a number of start-ups in the energy sector with a focus on sustainability and leveraging blockchain technologies.
	Matt Worth <i>Programme Manager</i>	Matt completed Engineering at the University of Newcastle while recording solar insolation data for sizing photovoltaic arrays and battery banks to reduce generator starts in remote communities. He has delivered road sensor technology, roadside infrastructure and has expertise in rail, construction and heavy equipment risk and compliance.



Glossary

AFSL	Australian Financial Services Licence
AI	Artificial intelligence, the ability of a robot to perform tasks commonly associated with intelligent beings
Big Data	Big data analytics relates to the collection and analysis of large complex data sets such that traditional data processing software is redundant. Challenges include capturing, storage, analysis, search, sharing, transfer, visualization, querying, updating and information privacy. Analysis includes user behaviour, predictive, and value extraction based on insights gleaned from global attributes.
blockchain	A ledger of records called blocks, which are linked and secured using cryptography. Each block contains a hash pointer as a link to a previous block, a timestamp and transaction data
Clearing price	The specified monetary value assigned to the asset
IoT	The Internet of Things (IoT) is a network of physical devices embedded with electronics, software, sensors, and network connectivity enabling control and the exchange of data
SAFT	A Simple Agreement for Future Tokens
SAFTE	A Simple Agreement for Future Tokens (or Equity)
smart contract	A computer protocol intended to facilitate, verify, or enforce the negotiation or performance of a contract.

Important Information

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