



Blockchain technology for transactive energy management

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We make Industry 4.0 possible by
re-thinking energy



Identity



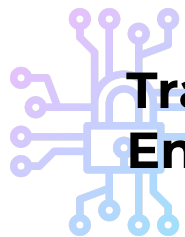
482.solutions is a software engineering provider specializing in innovative solutions using decentralized technologies.

The key competency of 482.solutions is creating solutions for “Industry 4.0” issues: Blockchain, Future of Energy, Digital Identity, Decentralized Asset Management, Financial Products and Services.



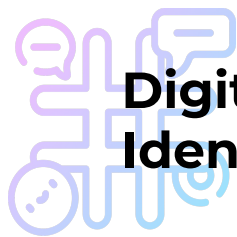
Electrodo

We create blended value in



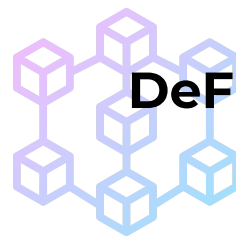
Transactive Energy

Innovation solutions for Smart
Grids and DERs approach
using distributed
technologies



Digital Identity

Innovation solutions for
managing digital identity in
distributed way: DIDs, dPKI



DeFi

Innovation solutions for
financial sphere, such as
tokenization financial assets
and securities

Synergy with Energy industry trendsetters



Energy Research Institute @ NTU

Established in June 2010, the Energy Research Institute @ NTU (ERI@N) distinguishes itself through excellence in basic research directed towards outcomes of high industry relevance, with focus on systems-level research for tropical megacities.



energy web

Energy Web Foundation -
The world's largest energy blockchain ecosystem



DTEK -
The largest energy holding in Ukraine



EV-UA -
The Ukrainian Electromobility Association

Electrodo

3D-Energy: The Future of Energy global agenda & challenges



DECARBONISATION

Shifting generation, transmission, distribution and usage towards a lower carbon future.

Renewable energy, e-Mobility, energy efficiency, new and future fuels, demand side management, etc.



44% of global generating capacity from renewables by 2025

1,600 GW of renewables capacity added between 2017 & 2025



DECENTRALISATION

New DG models with a proliferation of distributed and connected generation, closer to the point of use.

Distributed generation, energy storage, microgrids, prosumers, VPPs, P2P, etc.



12% of global generating capacity from DG by 2025

65% of DG investments will be distributed Solar PV



DIGITALISATION


Digital technologies to provide infrastructure for more flexible, intelligent, connected & responsive energy systems.

Smart grid, asset optimisation, demand response, automated trading, active energy management, etc.



50 Billion connected devices – or 'things' – globally by 2025

>\$1 Trillion economic value of IoT impact in energy by 2025



Electrodo



Electrodo: ecosystem for Transactive Energy management

spin-off powered by 482.solutions



Key partnership with Ecolabs Centre of Innovation for Energy
(established jointly by NTU, Enterprise Singapore, and SEAS)



ECOLABS
CENTRE OF INNOVATION FOR ENERGY

10

Programmes

33

Startups

30

Partners

8

Testbeds



LIVING LAB DEMONSTRATION



ELTD INTER

**ELTD
REG**

**ELTD
HUB**

**ELECTRODO
ECOSYSTEM**

**ELTD
DOC**

**ELTD
DEX**



**HYPERLEDGER
FABRIC**

BLOCKCHAIN



Electrodo solves 3 key industrial problems



**Transactive Energy
facilities ownership
management**



DERs identity and verification
(Hyperledger Fabric CA)



Distributed energy resource
management system (dPKI and X.509
standard)

**Transactive Energy asset
management & trading**



Energy Assets Management and Energy trading services to
control demand response using Smart contracts mechanism

**Security & Fault
tolerance**



Secure electronic document management system
(Hyperledger Fabric and IPFS)





ELTD INTER

is a service that provides cross-platform interoperability and data exchange with the external systems through API to deliver flexibility and transparency.



ELTD REG

is a service that allows to register organizations in the blockchain network.

ELTD HUB

is a service that is personal for each member of the ecosystem and it is created for membership management that implements the digital certificates managing the process in accordance with dPKI based on X.509 standard increasing cybersecurity fault-tolerance.

ELTD DOC

is an electronic document management system for the high-quality management of electronic agreements in the energy market created to provide transparent control over documentation, which is guaranteed using Hyperledger Fabric and IPFS technologies.

ELTD DEX

is a component providing the Assets Management and Energy OTC (Over-the-counter) trading services to control demand response using Smart contracts mechanism. This component provides the digital certificates to execute different types of contracts: Energy storage tolling contract, Capacity sales contract, Hybrid Power Purchase Contract, etc.

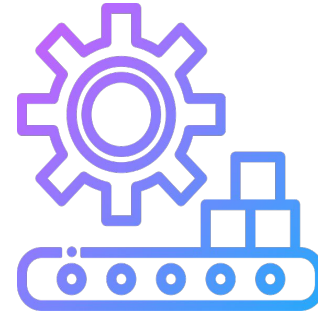


**HYPERLEDGER
FABRIC**

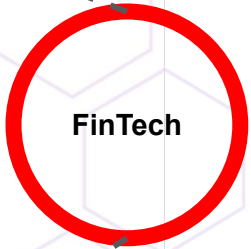
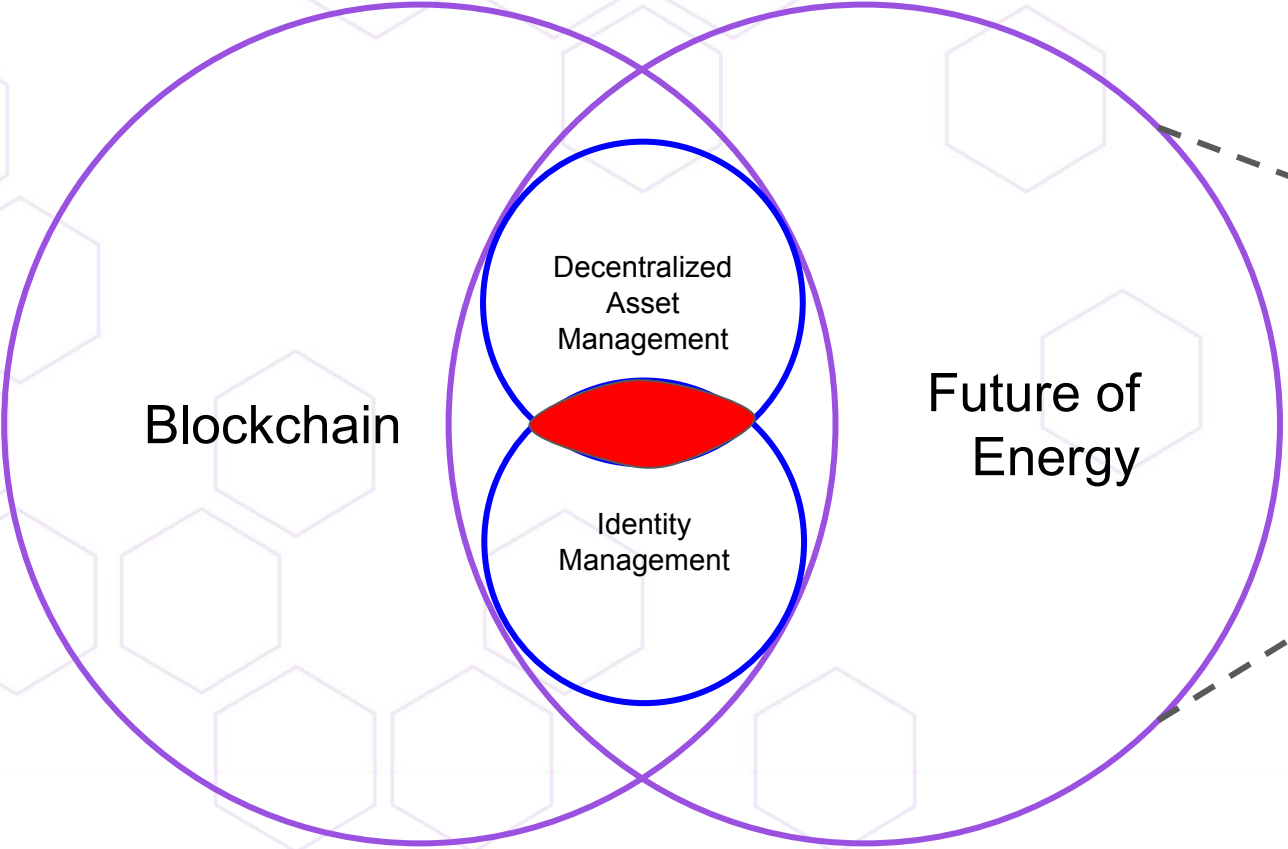
BLOCKCHAIN

provides the information for the amount of energy, it's transfer, prices and digital assets (tokens) for trading. Blockchain holds a full history of trading for analytics and stores the replica of this history via trusted ways. It also provides the PKI in the core. The nodes holders could be anyone who gets the allowance to work in the system.

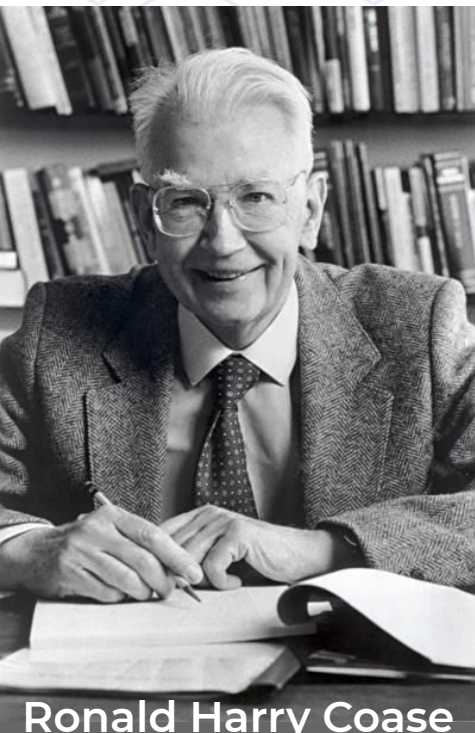
Research & Development groundwork



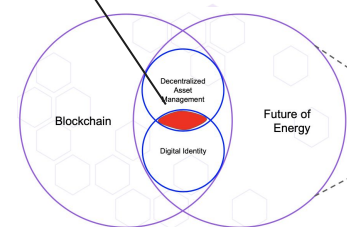
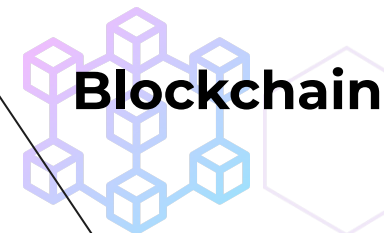
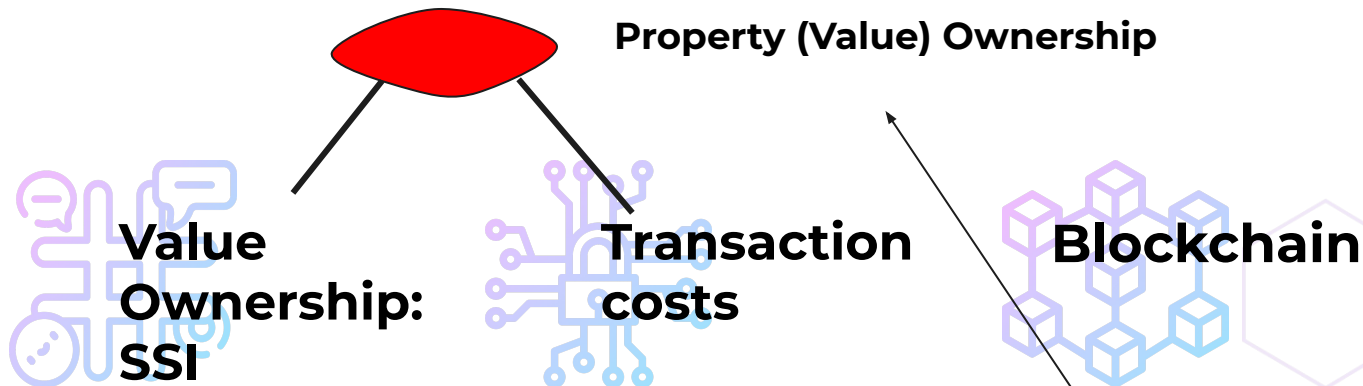
Problem domain



Electrodo eliminates transaction costs based on Ronald Coase's transaction cost theory



Ronald Harry Coase



Electrodo

Electrodo provides economic (intangible) layer



Tier-3 model

Value-chain machine

Tier-3

**FUNCTIONALITY/
ENTERPRISE LAYER**
(Application Software, Supply
Chain Management, Enterprise
Resource Planning)

Intangible
(Internet-of-Value)

Tier-2

DATA-PROCESSING LAYER
(Big Data, AI and ML algorithms,
Security, Cloud)

Soft
(Internet-of-Things)

Tier-1

COMPONENT LAYER
(Industrial motor, Machines,
Smart devices and Tools)

Hard (Things)

Electrodo provides economic (intangible) layer for



Transactive energy



Renewable energy



Smart Grids



e-Mobility



USE CASES



Peer-to-peer
energy assets
trading



DER (Distributed
energy resources)
identity and access
management



Energy assets
ownership
management



Electricity
distribution
management



REC (Renewable
Energy Certificate)
management



Electricity-as-a-
commodity
business model
execution



Distributed data
storing and
management

We are looking for synergy with Energy corporations and GreenTech firms



Co-development & commercialization



Pilot R&D projects on Singapore testbeds

Goals / Outcomes

- 8th TRL
- Technology commercialization
- IP registered and 1 patent
- Ronald Coase “Transaction costs theory” confirmation
- United Nations SDGs: goals 7, 9, 4

Roman (Strategy)



Alex (Marketing)



Electrodo's Team



Leonid (Community)



Artem (R&D)



Sergey (Product)



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SOLUTIONS