CO-TRICITY

Energy meets Blockchain

by

INNO HUB VATION by innogy

CONSENSYS

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20.09.2016

Meet Anna, our customer!

https://www.youtube.com/watch?v=gNOC2V0H4IM

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Match Local Energy Producers with Consumers

- Renewable energy matchmaking between local energy producers and consumers via the blockchain

- Truly digital, scalable solution: No box / additional device needed

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Added Value for Prosumers & Consumers

- **PROSUMER** - Give them more **choices** and **meaning**: energy they produced will be consumed locally
- **LOCAL CONSUMER** - We create a direct connection between buyer and seller, allowing the consumer to engage with the suppliers (most likely their customers) on a whole new level; the consumer can use locally produced, renewable energy without the need to invest in an own installation
- **GRID** - In the long run we prevent the new-building of high-voltage grids and help with the integration of distributed energy resources
- **GENERAL** - Solution for the growing demand for proper labelling / certification of local green energy

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Co-tricity connects the Stakeholders using the Existing Framework

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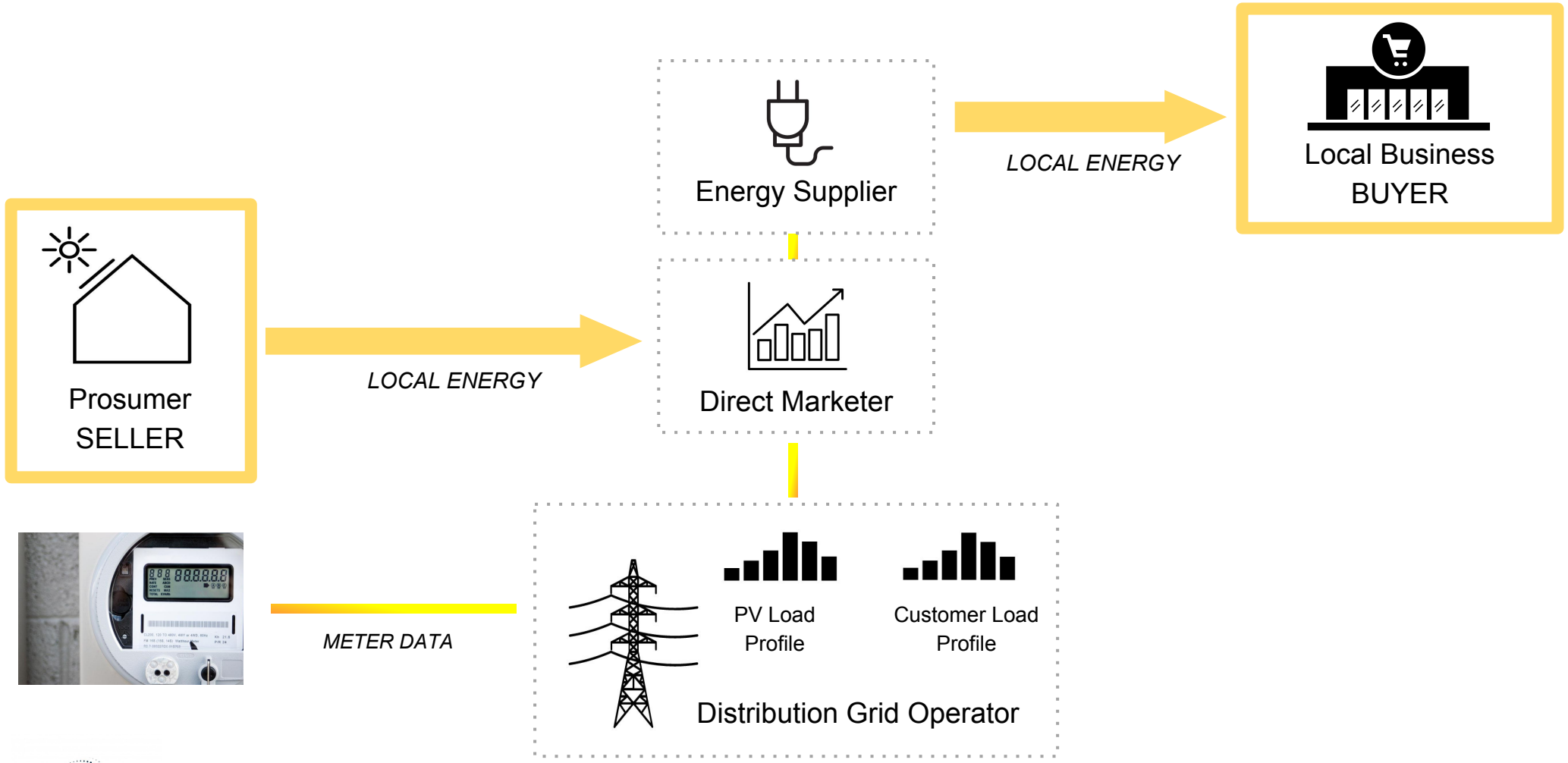
Co-tricity connects the Stakeholders using the Existing Framework



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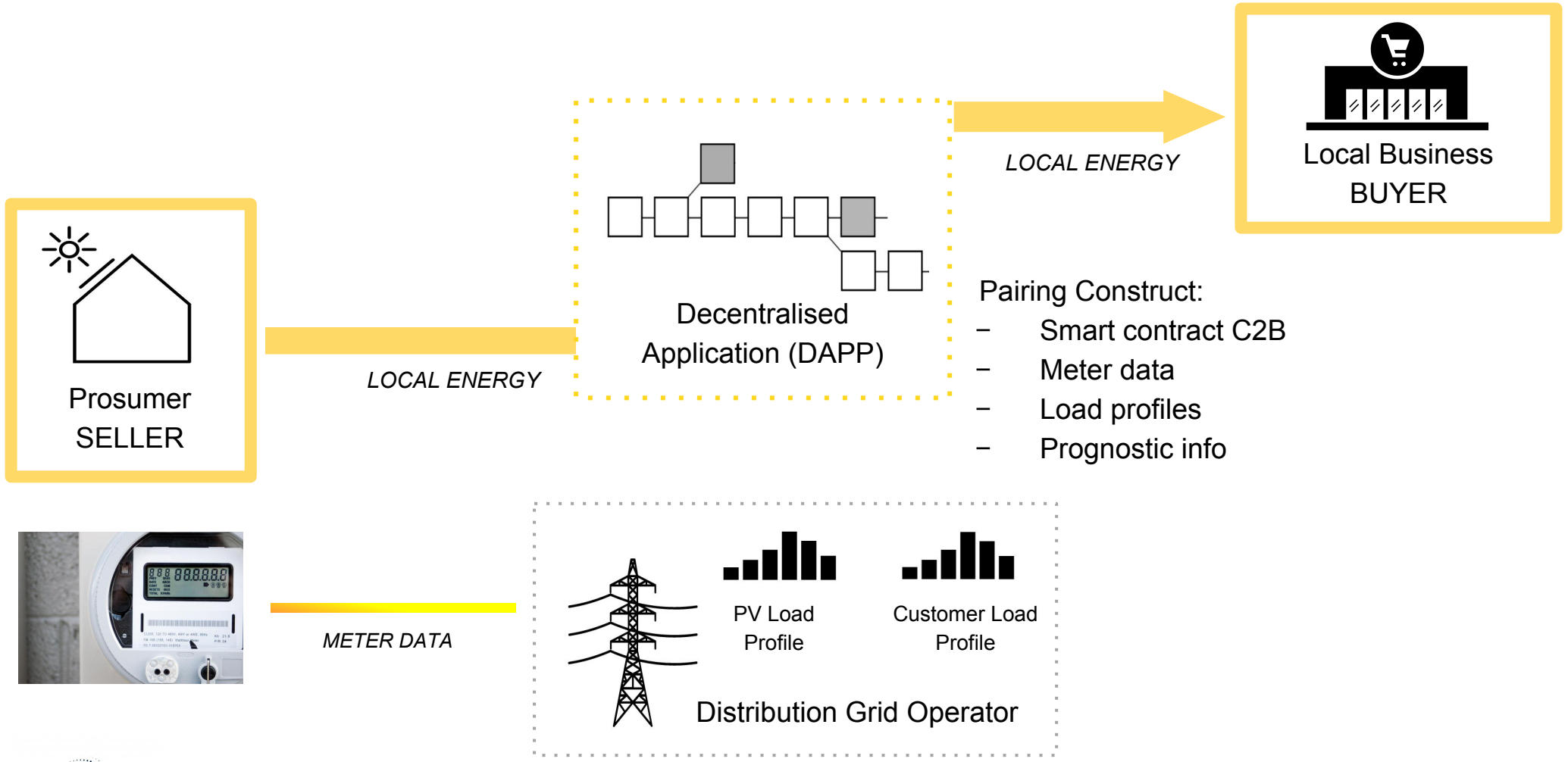
For Our Service Model, we develop a DAPP that makes use of Smart Contracts



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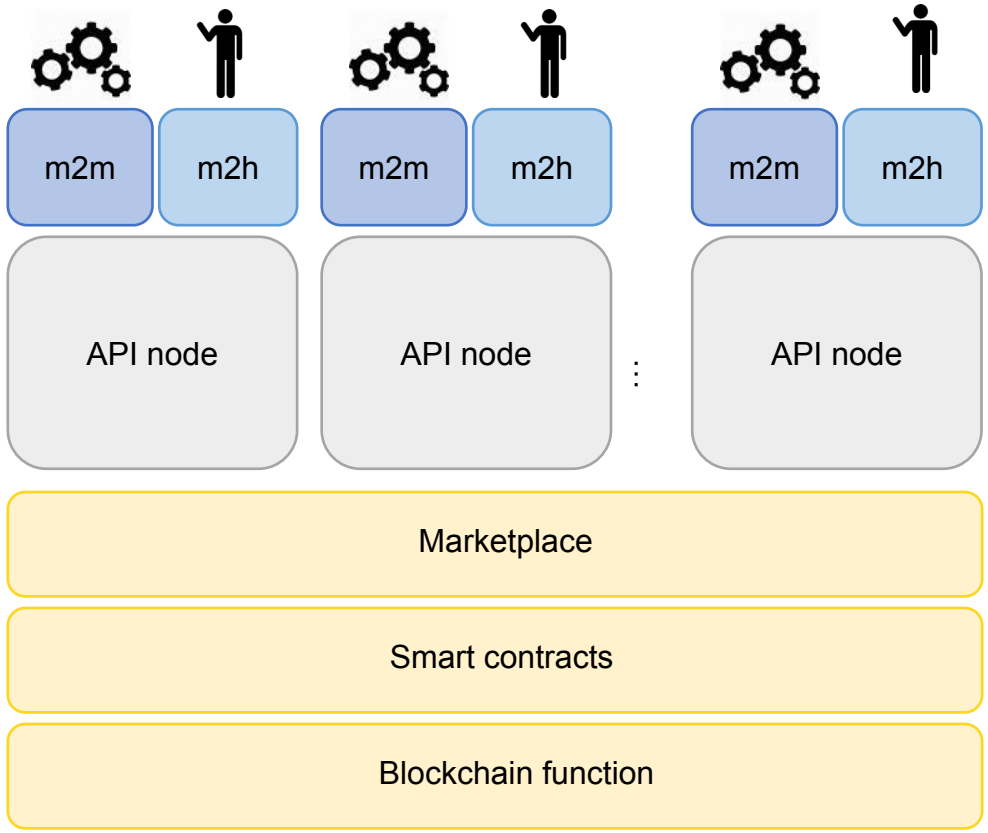
Architecture integrates Blockchain with Market Players



- Integration of market actors happens with aid of the blockchain market place via APIs with M2M and M2H interfaces

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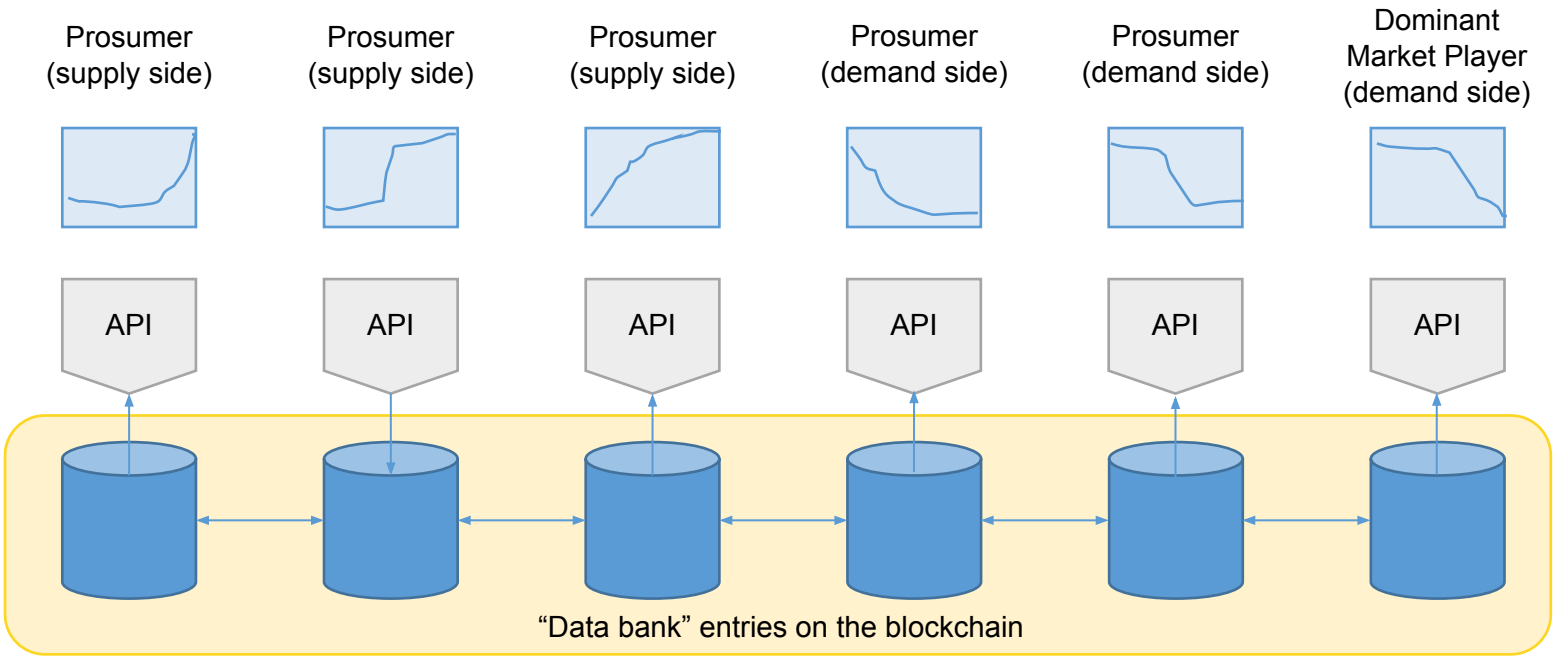
Offers Supply and Demand Management on the Blockchain

- (PV) forecast data and load profiles of prosumers and consumers are stored on the blockchain
  - The respective data is made accessible for the market actors



Adapted figure as seen in „Potential of the Blockchain Technology in Energy Trading" by Michael Merz

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Blockchain Architectural Overview

Two ways to approach blockchain energy:

- REC approach, total fungibility, speculatory, incentive focused
- Physical approach, time and place matters, energy losses, no or limited reselling

Co-tricity is a platform for both, but with a focus on the second approach.

Deals with **predicted** energy data with later reconciliation process

Predicted data and actual meter data provides the base layer upon which further financial layers can be built

No “energy token”, but rather “transferable energy record” containing information about origin

Using predictions, prosumers can participate in the day ahead market.

Their risk is diminished by the law of large numbers.

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Energy Production Reconciliation Process

Three actors:

Prosumers

Buyers

Co-tricity

When real meter data enters the system:

- Prosumers are compensated based on their actual meter production data
- Buyers are compensated by Co-tricity if they bought predicted energy that was not “accounted for” with actual meter data.
- Co-tricity wins/losses is a function of the accuracy of the prediction:

Cotricity_balance = predicted * buyerPrice - (predicted - actual) * compensationFactor - actual * prosumerPayout

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Generalizations

Compositionality: not only prosumers benefit from pooling together and cooperate, also neighborhoods, cities and countries.

The risk management, reconciliation process and predictions look similar at each level.

Small parties cooperate to diversify risk and become a bigger player

Participate at a market earlier in the supply chain: i.e. move from retail to wholesale

Blockchain as a cooperation platform:

Blockchain + Energy market a perfect example of mechanism design

- Goal: effectivize the energy market and reduce costs

- Means: Creating incentives such that the optimal strategy for every participant results in the realization of this goal.

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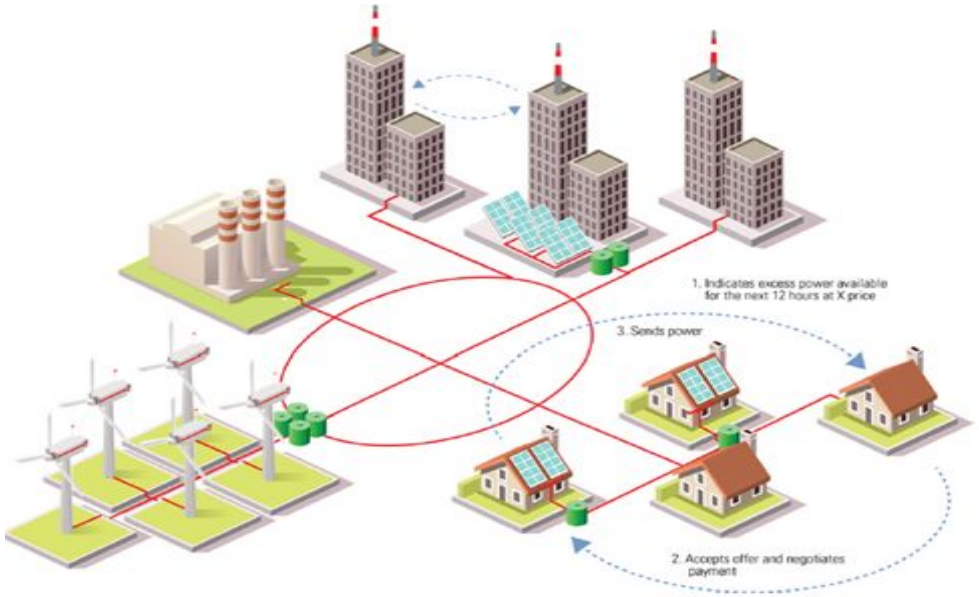
The “Blockchain + Energy” Opportunity



What blockchain can do...

“Enable transactions in a decentralized power market. Blockchain can connect local power generators to consumers in their area, enabling distributed, real-time power markets. A blockchain-enabled market could also increase grid security and spur of smart grid technologies.”
- *Goldman Sachs Blockchain Report 2016*

The opportunity in numbers

- **$ 2.5 - 7 Billion**
  new US market for distributed power
  - *GS 2016*

By 2020…

- **2 million households** with solar PV in Germany
- **2 TWh surplus energy** of these households

By 2025…

- **10% of the world’s GDP** will be stored on blockchain technology - *World Economic Forum 2015*

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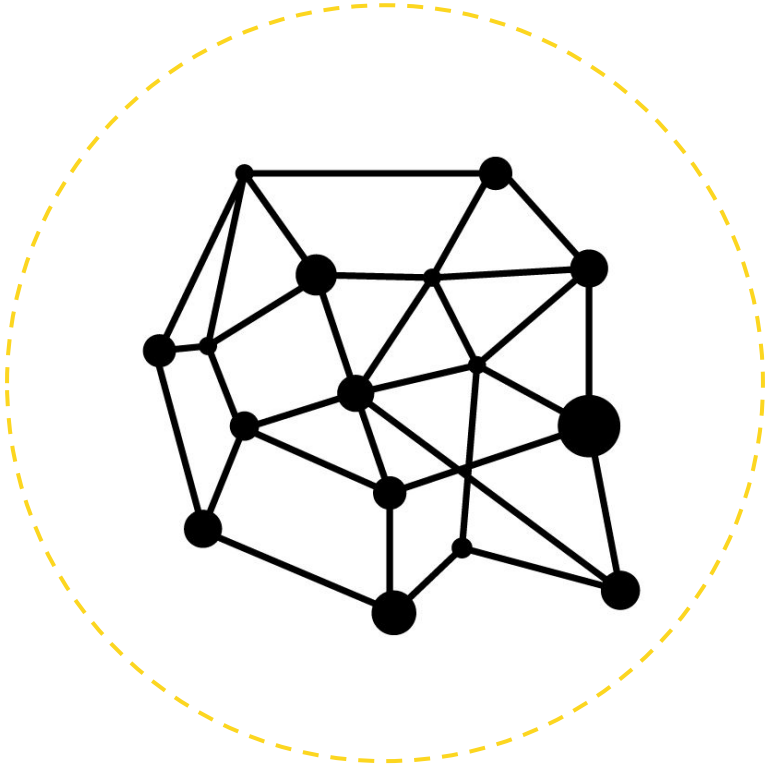
Blockchain Technology solves Major Problems for the future Digital Energy System



Blockchain solves major problems for the future digital energy system

- **Interoperability** ▹ Delivers a common standard for data format, business processes and communication protocol
- **Parallel products** ▹ running software on the blockchain means a common environment for products
- **Characteristics** ▹ everyone can access; always on; immutability; real time; mass data; payment as a by-product
- **Trust** ▹ Shared truth through 51% rule of all nodes in the system on public blockchain
- **Security** ▹ Within the system all data is encrypted

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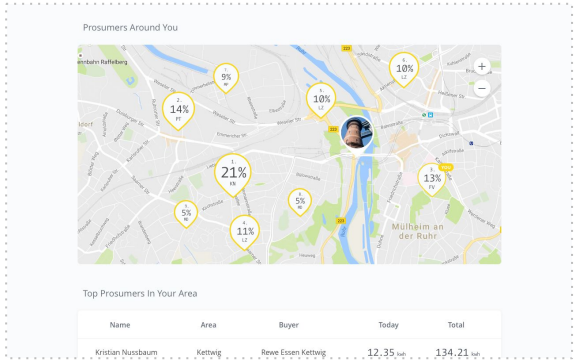
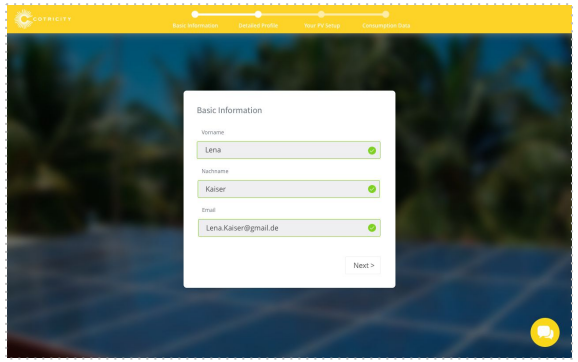
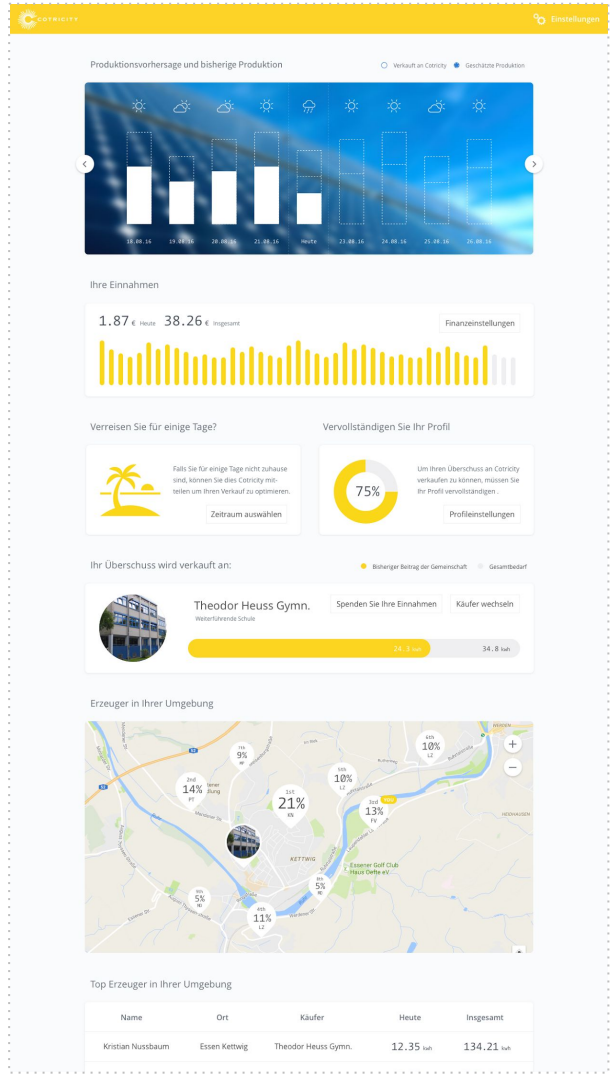
Current Project Status

- On-boarding for Phase I
  - **20 prosumers in Fall 2016**
  - **1 local High School consumer**
- Data collection and testing of backend blockchain processes
- UI / UX development and testing
- Further prosumer recruitment







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