exnaton

/ɛçnatɒn/

Your software partner for the transition to renewable energy

Dr. Arne Meeuw

A new mindset is on the horizon

- SUSTAINABILITY MOVEMENT
  Interest in sustainability is rising fast.

- ONGOING DIGITALIZATION
  A digital representation of energy data is more and more available due to smart meter technology.

- NEW REGULATION IN FAVOR OF RENEWABLE ENERGY
  Switzerland is currently discussing to allow individuals to sell solar electricity to their neighbors
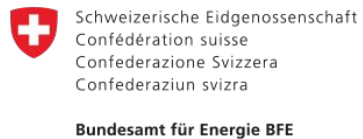
exnaton

Quartierstrom - Switzerland's first real-world P2P energy market

a research project led by

ETH zürich · Universität St.Gallen

funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Energie BFE

partnered with

WEW · SPRACHWERK WIR SCHAFFEN PRÄSENZ · zhaw

HOCHSCHULE LUZERN · Cleantech21 · SCS

SWiBi RUND UM IHRE ENERGIE · BKW · SBB CFF FFS

covered in

SRF · EVENT HORIZON · CNN Money SWITZERLAND

WORLD ECONOMIC FORUM · Blick · südostschweiz

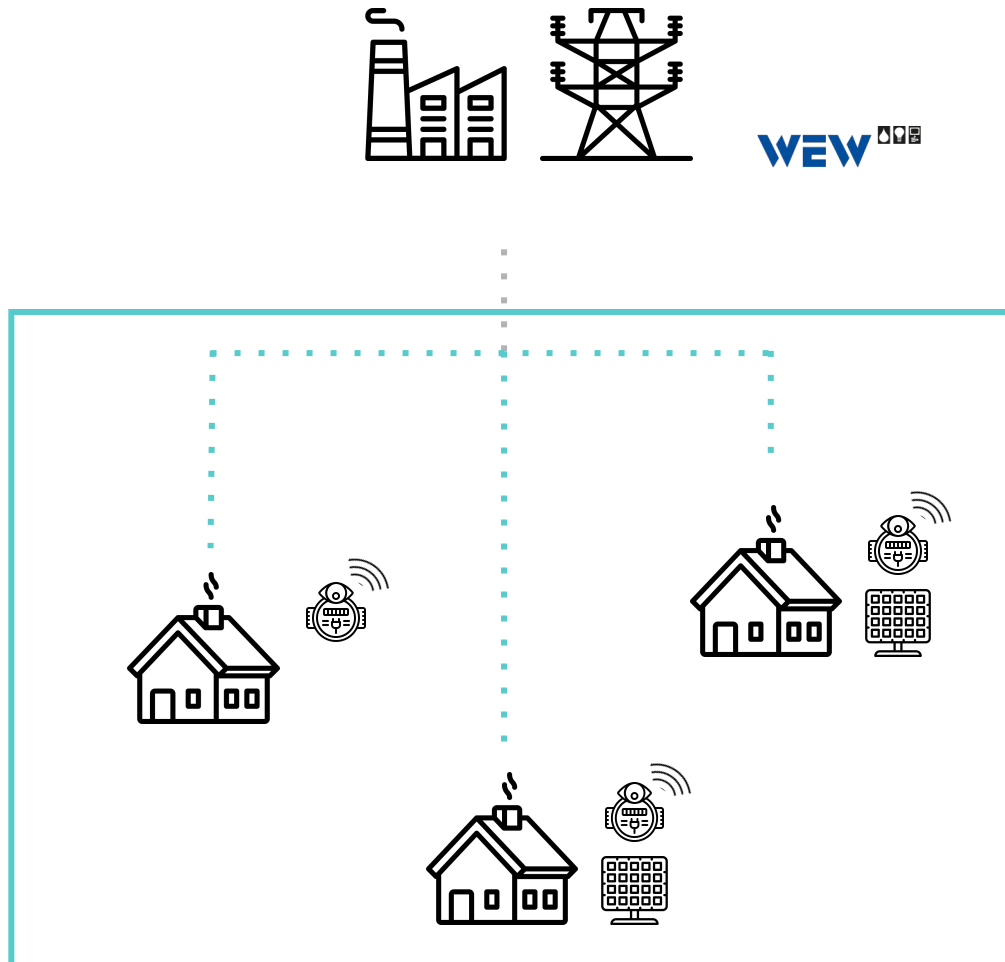exnaton

Connecting households to form an energy community...

WEW

+ pilot project in Walenstadt, CH

+ project duration of 1 year (2019)

+ 35 households and 2 SME participated
  (28 photovoltaic systems,
  8 battery storage systems)

+ cooperation with a local energy provider

+ usage of the local network
  infrastructure

4

exnaton

...enabling trade of locally produced electricity via the blockchain

+ deployment of 75 smart pis as smart meters

+ distributed platform based on blockchain technology

+ market settlement every 15 min

+ double auction with price preferences of users

+ P2P transactions

5

exnaton

...and visualizing energy data for the participating households
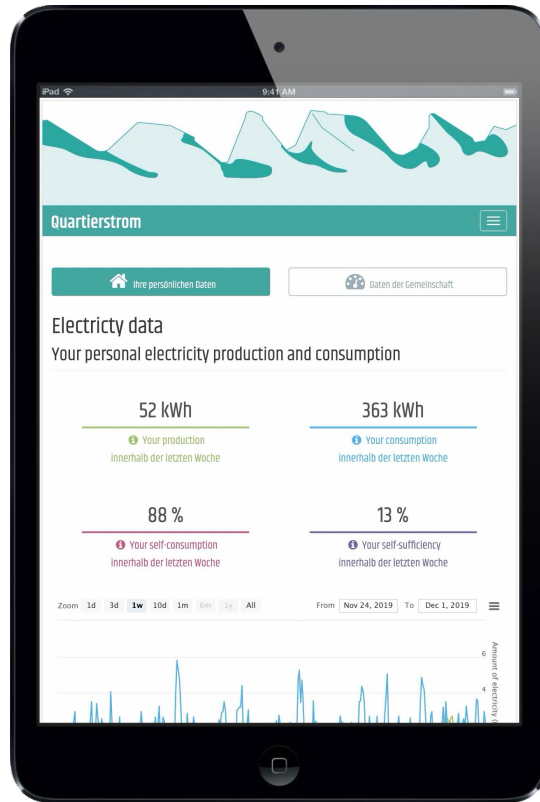
The web application

+ web application accessible via the browser

+ setting prices options

+ real-time insights on energy and market data

+ community identity

6

exnaton

In theory, technology and interest in P2P energy markets is given, but...

+ **hardware**: smart pis worked quite well, but cannot be used in a productive environment

+ **software**: technical feasibility based on blockchain was demonstrated

+ **P2P energy market**: real-time electricity prices above feed-in tariff and below retail tariff

+ **user acceptance**: high user satisfaction, users intensively engaged with the application

+ **energy provider**: pioneer work, innovative image, customer relationship increased, wants to continue offering P2P energy markets

+ **public interest**: high media attention, cooperation proposals, invitations to events

+ **challenges**: regulation for collective self-consumption not yet there for the case of Switzerland

7

exnaton

Project whitepaper and scientific publications

Ableitner, L., Meeuw, A., Schopfer, S., Tiefenbeck, V., Wortmann, F., Wörner, A. (2019) Quartierstrom - Implementation of a Real World Prosumer Centric Local Energy Energy Market in Walenstadt, Switzerland. Available on arXiv

Ableitner, L., Tiefenbeck, V., Wörner, A., Fleisch, E., Designing a Peer-to-peer Energy Market from the User Perspective. Under Review at Energy Research and Social Science

Ableitner, L., Tiefenbeck, V., Meeuw, A., Wörner, A., Fleisch, E., Wortmann, F. User Behavior in a Real-World Peer-to-Peer Electricity Market, under Review at Applied Energy

Ableitner, L., Schopfer, S., Tiefenbeck, V. (2018) The Role of the User in Peer-to-peer Energy Communities. Proceedings of 5th European Conference on Behaviour and Energy Efficiency (behave)

Meeuw A., Schopfer S., Wortmann F. (2019) Experimental bandwidth benchmarking for P2P markets in blockchain managed microgrids. Energy Procedia

Meeuw A., Schopfer S., Ableitner L., Wörner A., Tiefenbeck V., Wortmann F. (2020) Implementing a blockchain-based local energy market: Insights on communication and scalability. Accepted for publication at Computer Communications

Wörner, A., Meeuw, A., Ableitner, L., Wortmann, F., Schopfer, S., Tiefenbeck, V. (2019) Trading Solar Energy within the Neighborhood: Field Implementation of a Blockchain-Based Electricity Market. Energieinformatik 2019

Wörner, A., Ableitner, L., Meeuw, A., Wortmann, F., Tiefenbeck, T .(2019) Peer-to-Peer Energy Trading in the Real World: Market Design and Evaluation of the User Value Proposition. International Conference on Information Systems 2019

exnaton

From research to product: Spin-off Exnaton is being founded

Liliane Ableitner, PhD
UX & frontend
in Quartierstrom

Arne Meeuw, PhD
Lead developer
in Quartierstrom

Anselma Wörner
Market design
in Quartierstrom

Spin-off

e x naton

+ product focus
+ software provider for P2P energy markets
+ potential customers: energy providers, smart meter producers, etc.

More information and newsletter registration on

www.exnaton.com

exnaton

Quartierstrom in the energy sector and beyond

- **MVP rollout**
  - 76% app signup rate of 37 potential testers
  - **20 MAU** over 11 months
- **11** invited talks and **7** scientific publications
- **Project was mentioned** in proposal to change regulation by Nationalrat and SFOE
- **Product development** pilot with partnering utility company planned for 2020
- **Promising leads** with further utility companies established

partnered with

covered in

awarded by

exnaton

Following the success of our proof-of-concept, we now open a new chapter

JAN 2018	first ideas and concepts
MAR 2018	development start
JAN 2019	start of 1-year field test with prototype
APR 2019	user evaluation
SEP 2019	acceptance of our PhD theses
	and winner of the SDG award by SGES 2019
OCT 2019	decision for startup, start of operations
JAN 2020	pilot customer in Walenstadt
	market validation with energy providers
FEB 2020	selection for the Circular Economy Incubator by Swiss Impact Hub
	Innosuisse Initial Coaching Grant
MAR 2020	winner of the Smart City Innovation Challenge by energieschweiz

Quartierstrom

a research project led by

ETHzürich   Universität St.Gallen

and supported by   Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Energie BFE

exnaton

The EW Walenstadt continues to work with us

Quartierstrom pilot project enters next round

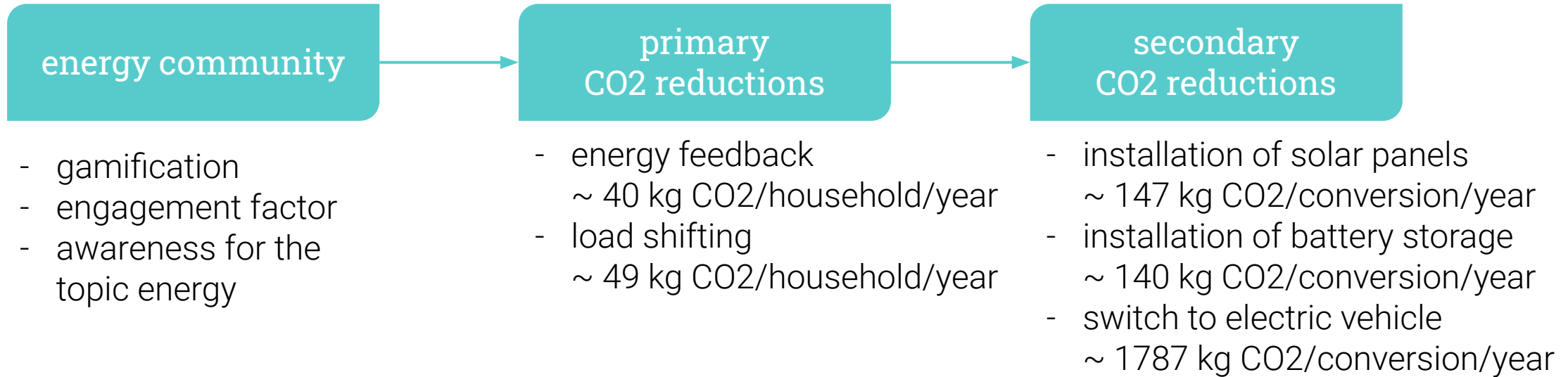Agile product development pilot with beta users

Onboarding of further users

Christian Dürr, CEO EW Walenstadt

"In order to further exist as an energy provider, we have to go with new technologies and be open for innovation."

"The Exnaton team did excellent in the Quartierstrom project. With their technical and analytical competencies they worked highly precisely and customer oriented. I am looking forward to our continued cooperation in 2020."

12

exnaton

The energy community as vehicle for CO2 reductions

energy community	primary CO2 reductions	secondary CO2 reductions

- gamification
- engagement factor
- awareness for the topic energy

- energy feedback
  ~ 40 kg CO2/household/year
- load shifting
  ~ 49 kg CO2/household/year

- installation of solar panels
  ~ 147 kg CO2/conversion/year
- installation of battery storage
  ~ 140 kg CO2/conversion/year
- switch to electric vehicle
  ~ 1787 kg CO2/conversion/year

Find our assumptions for this calculation here.

A community of 1000 households could potentially reduce its carbon footprint by **116 t CO2** per year. This is equal to the CO2 absorption potential of **1451** trees.

13

exnaton

*We use smart meter data to support energy providers
and their customers in realizing the energy transition.*

*Through our experience we provide technical expertise in
software development, data analytics, and data visualization.*

WRAP-UP: VISION AND MISSION

exnaton

Thank you!

exnaton

www.exnaton.com

Stampfenbachstrasse 52
c/o ETH Entrepreneursclub
CH-8006 Zürich

liliane@exnaton.com
+41 78 403 75 02

arne@exnaton.com
+41 76 479 27 63

anselma@exnaton.com
+49 172 736 21 32