Lucerne University of
Applied Sciences and Arts

HOCHSCHULE
LUZERN

Technik & Architektur

A business model based on the real-time distribution of renewable electricity ~~producers and consumers~~ – insights and retrospections.

R&D
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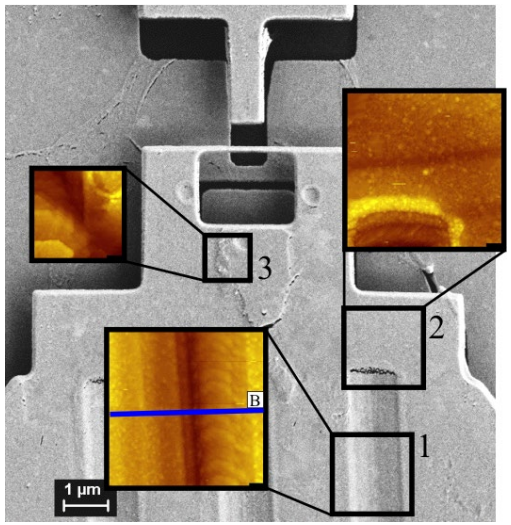
Horw 13.12.2018

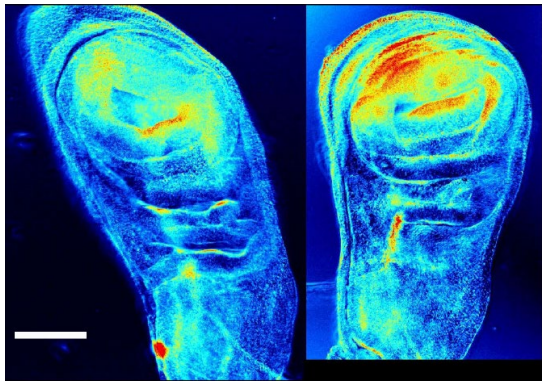
About me

Nanotechnology



Universität Konstanz

Systembiology



Universität Zürich[UZH]

SystemsX.ch
The Swiss Initiative in Systems Biology

Energysystems

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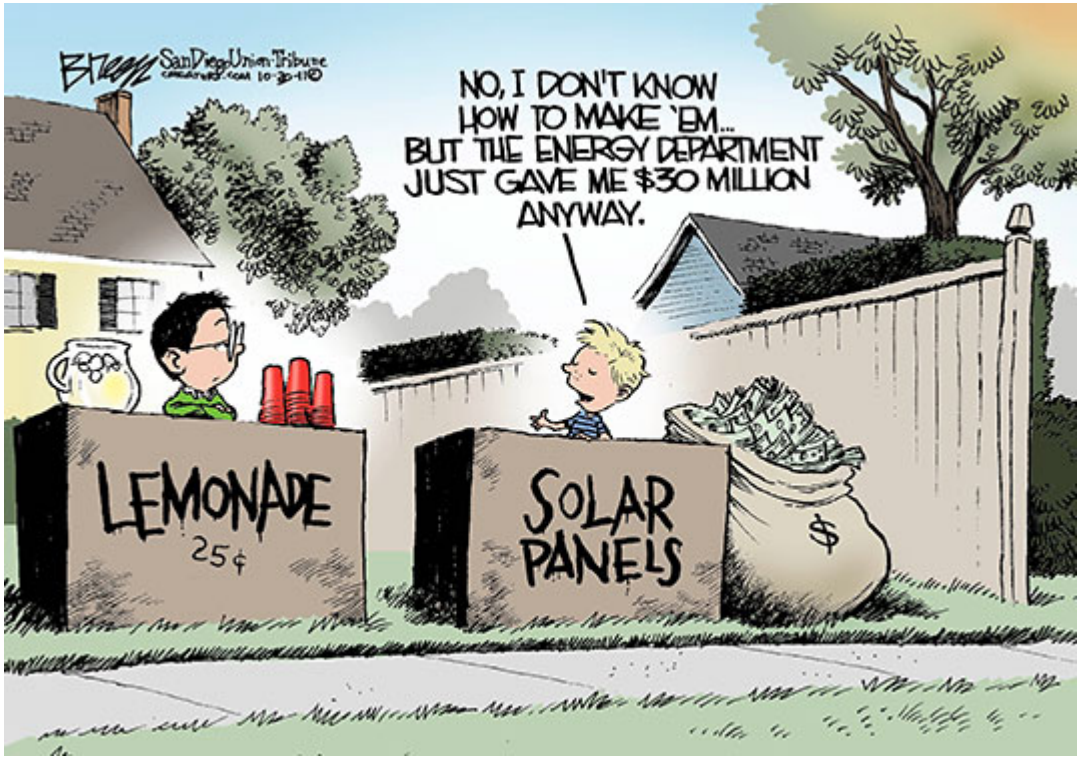
sccer | future energy efficient buildings & districts

Achieving the Swiss Energy Turnaround by…

- INCREASED efficiencies
- MORE renewable energy systems

And who will pay? – We all for instance

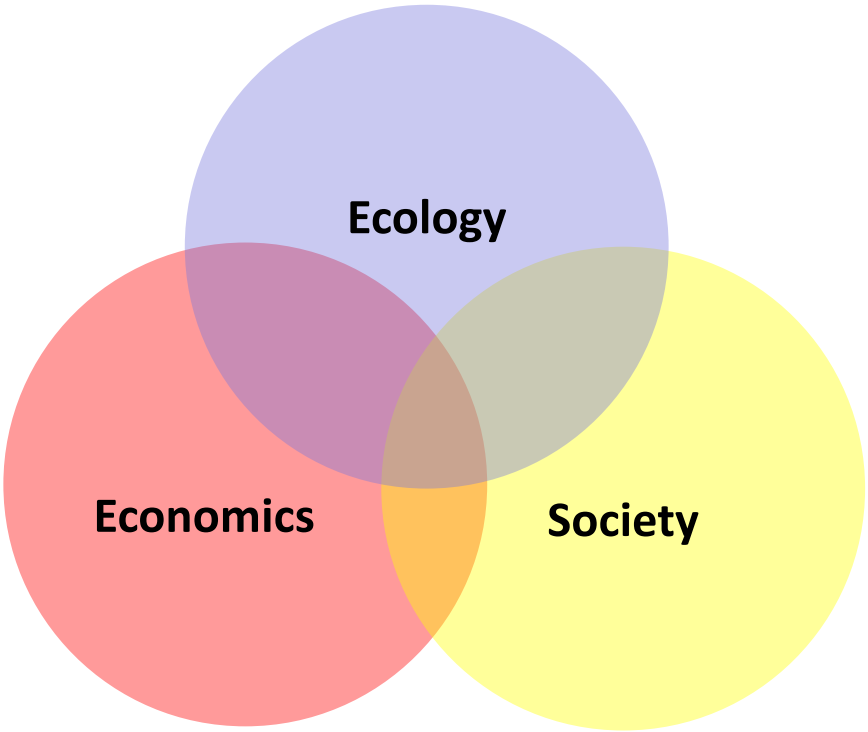


What about KEV[1)]/EIV[2)]?

- End 2017 about **34'000 applications** on KEV waiting list.
- Since Jan 2018:
  - net charge raised from 1.5 Rp/kWh to **2.5 Rp/kWh**
  - plants up to 100kW receive EIV – single renumeration
  - Plants above 100kW can apply for KEV.

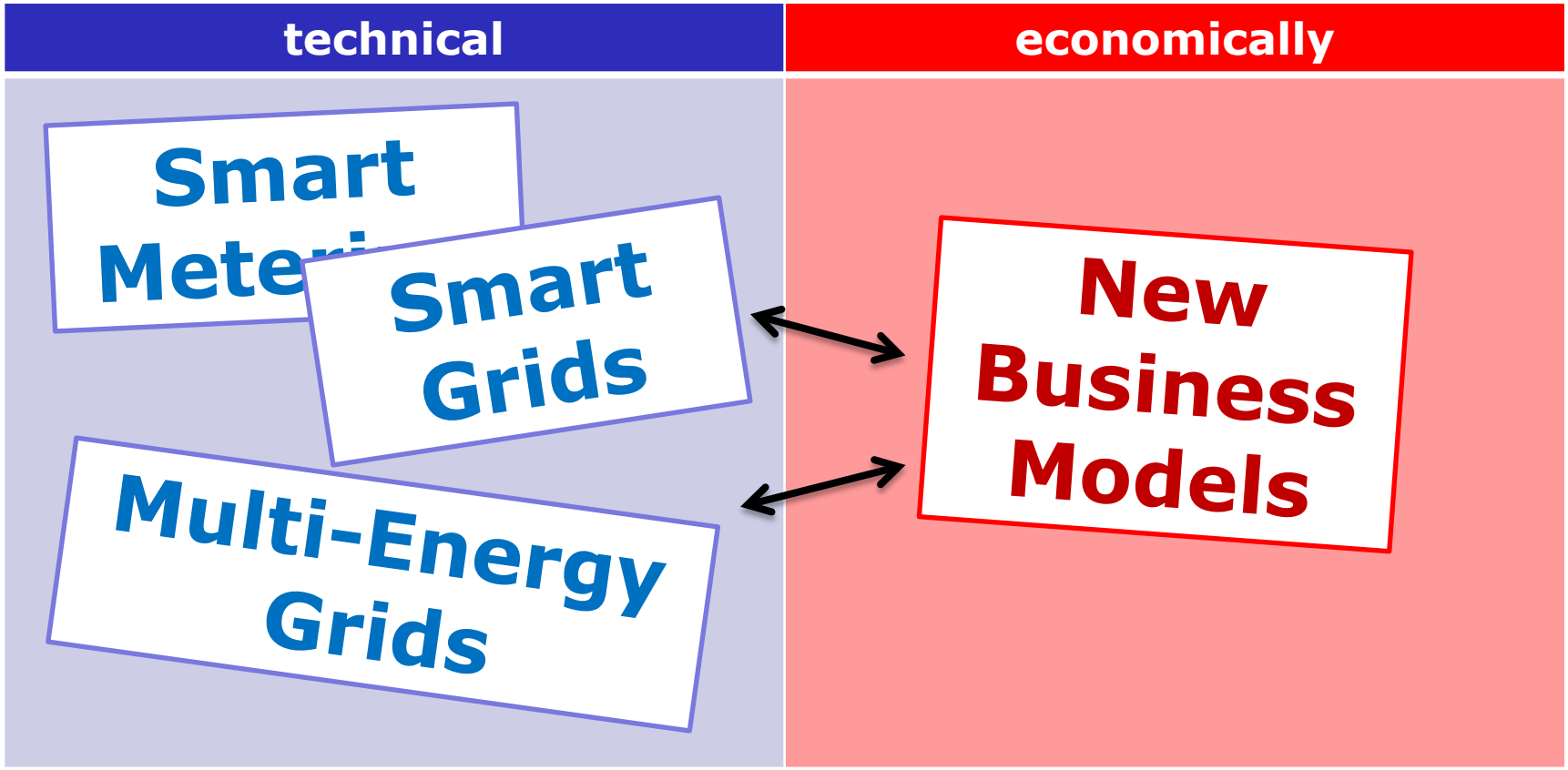
BUT

- Applications received till **June 30th 2012** will be renumerated
- plants applying **today** will probably receive **no renumeration**



1) KEV – Kostenorientierte Einspeisevergütung (cost-oriented feed-in renumeration)
2) EIV – Einmalvergütung (single renumeration)

How to integrate renewables?



Change38

IDEA AND INFRASTRUCTURE

Change38 – some keywords

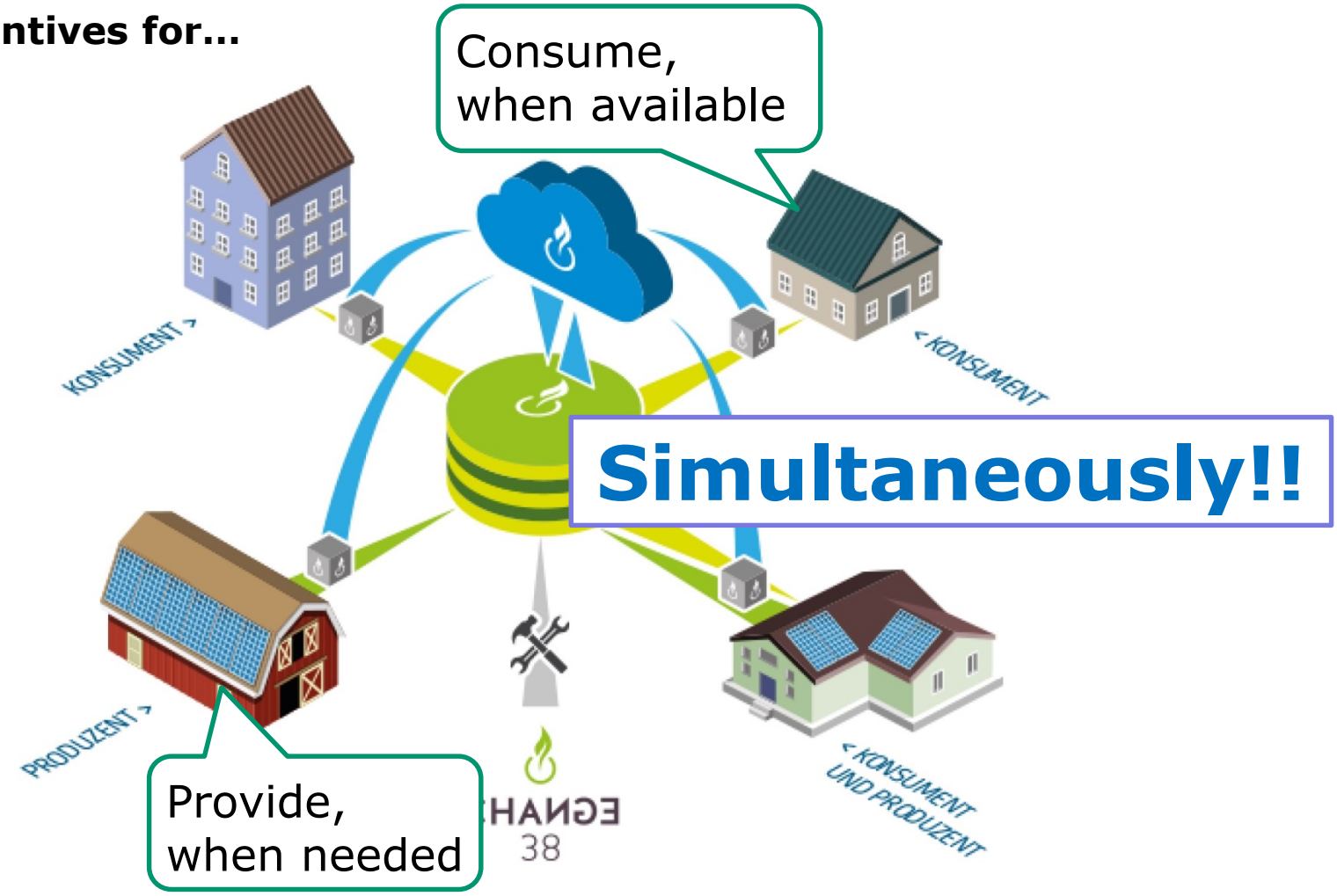
- founded 2013 by Robert Bühler:
- Visions:

  «The Energy Turnaround in one generation!»

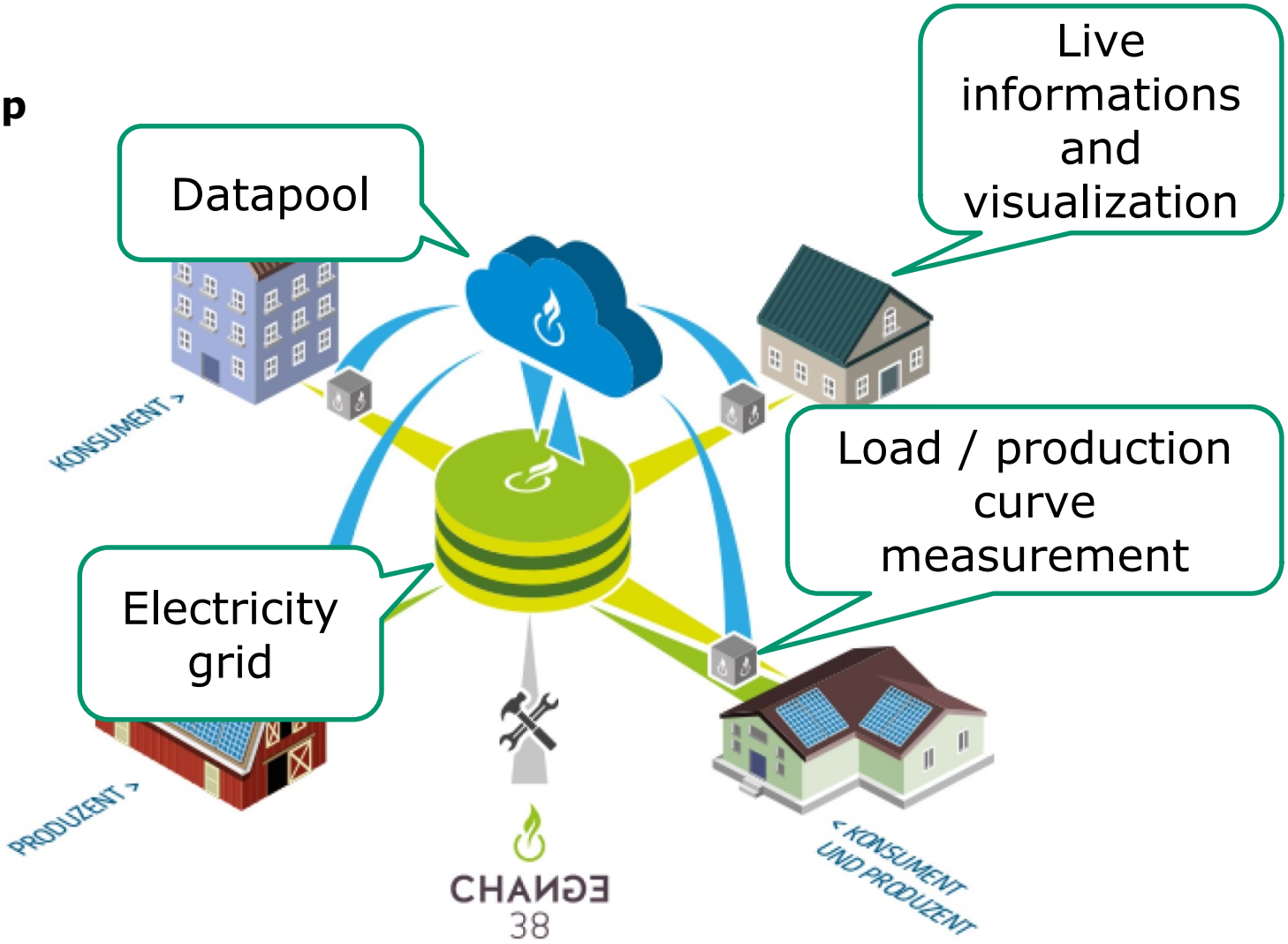
  «Electricity from your neigbhour!»

  «Consumption and production alined!»

The idea:
Set incentives for…



The setup


Datapool
Live informations and visualization
Load / production curve measurement
Electricity grid
KONSUMENT >
PRODUZENT >
< KONSUMENT UND PRODUZENT
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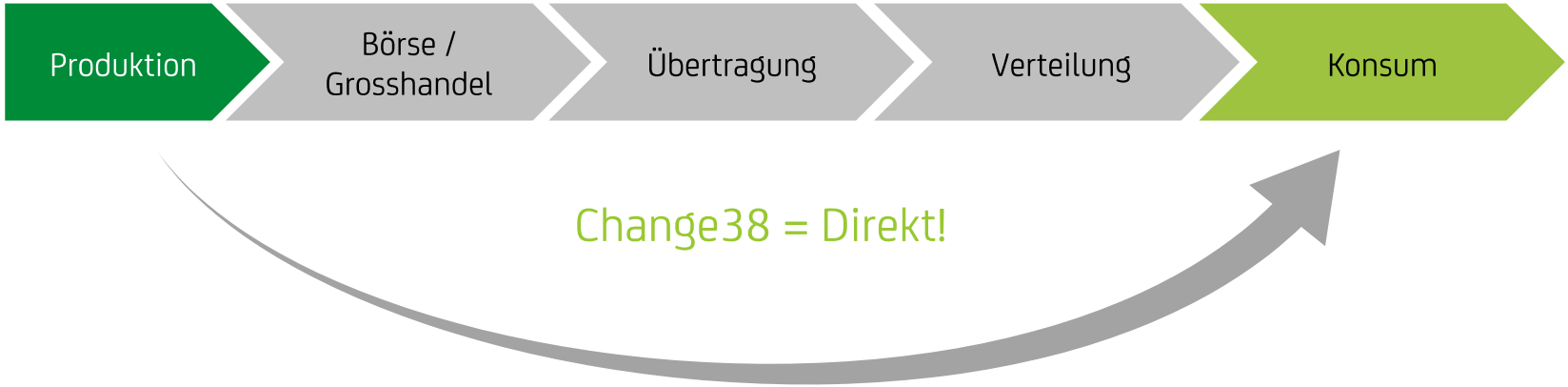
DEVELOPING A BUSINESS-MODEL

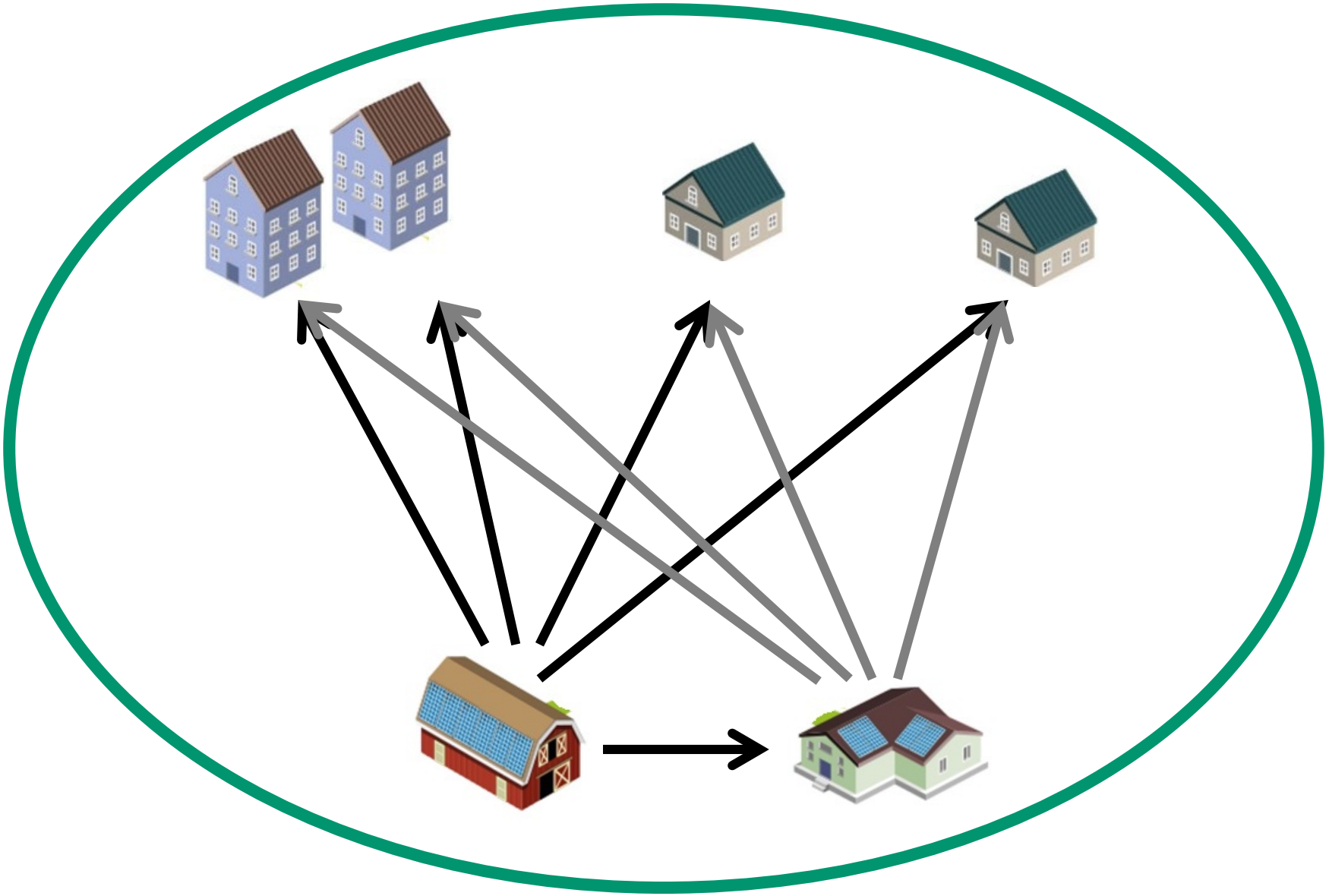
Sharing Economy

Hauptbereiche der Sharing Economy in der Schweiz!

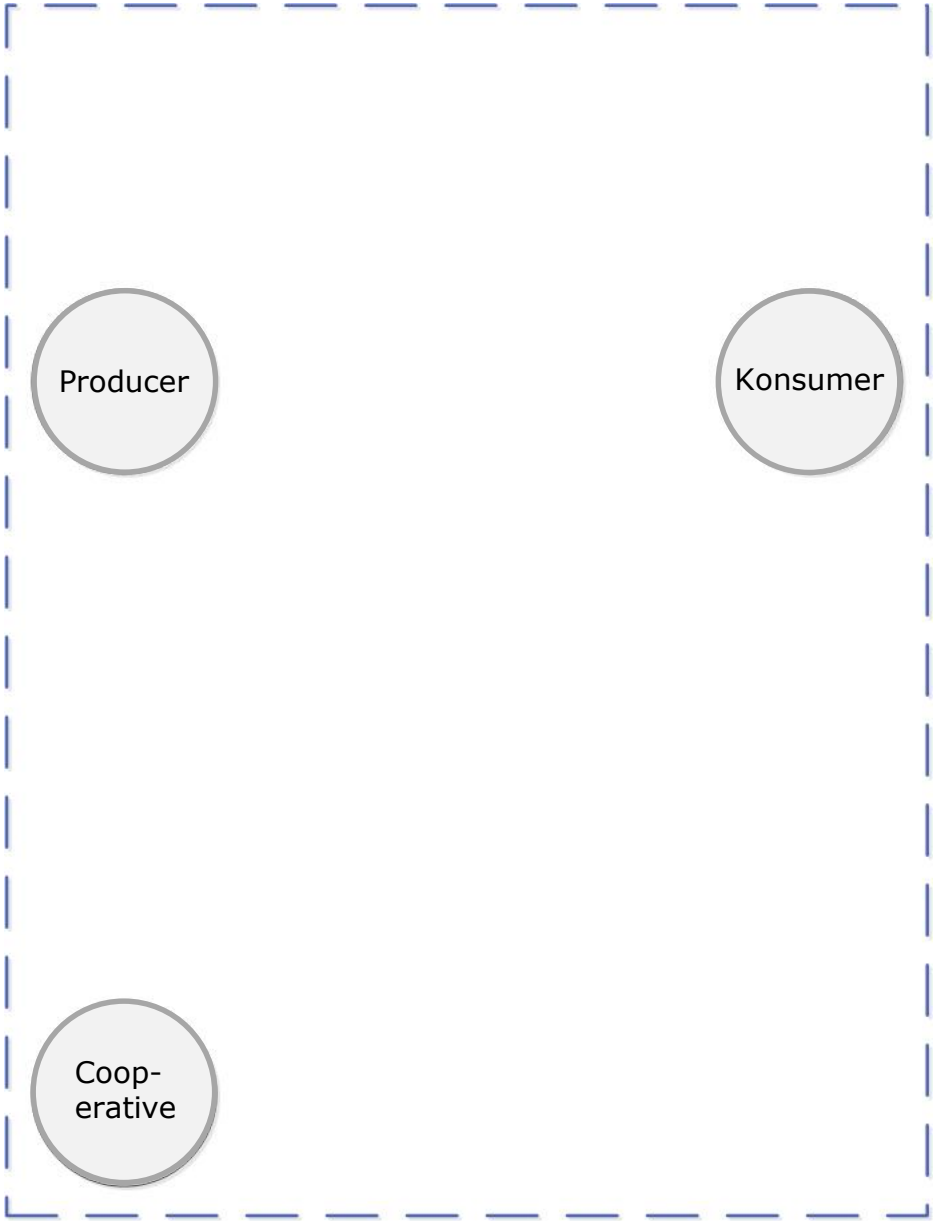
Wertschöpfungskette Strom



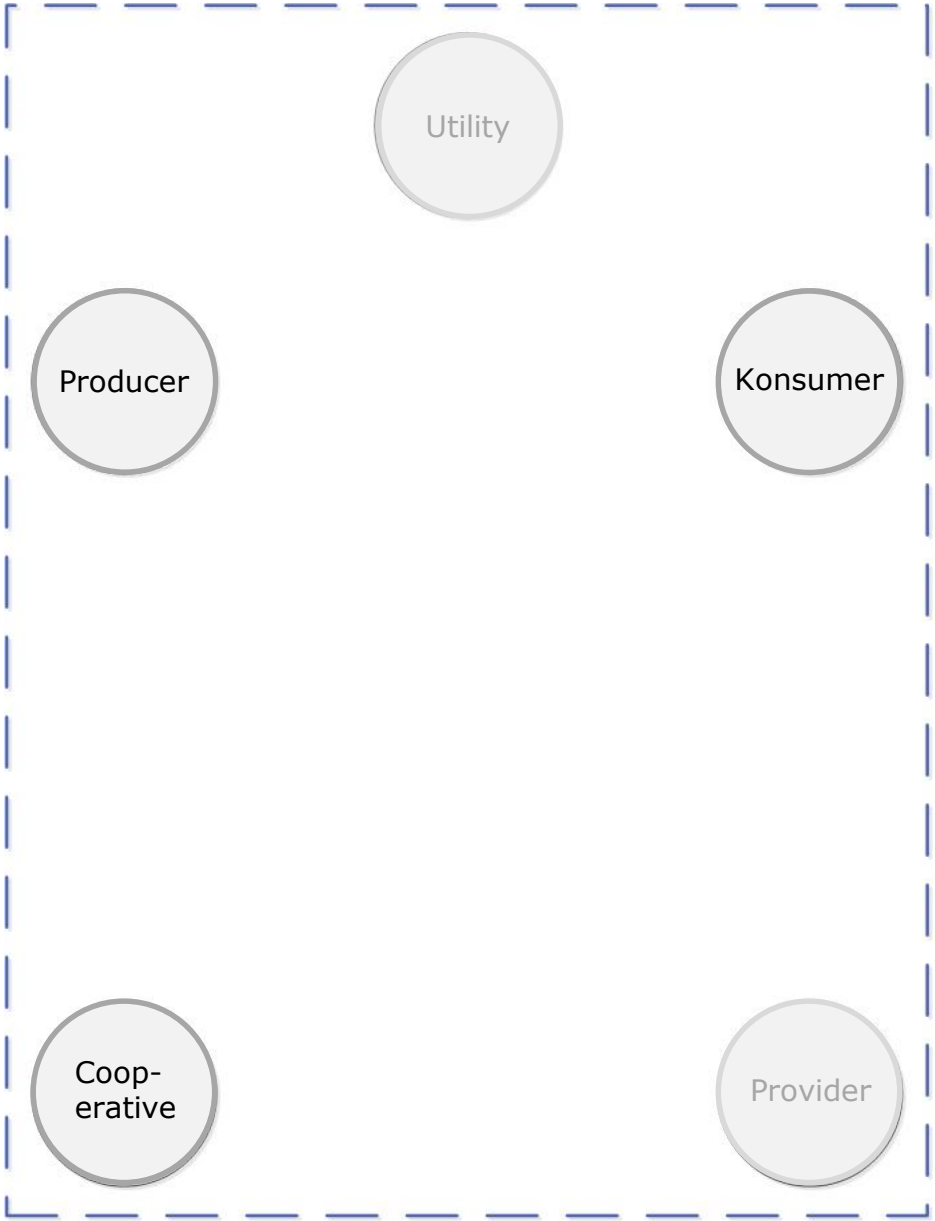
- Shared Parking



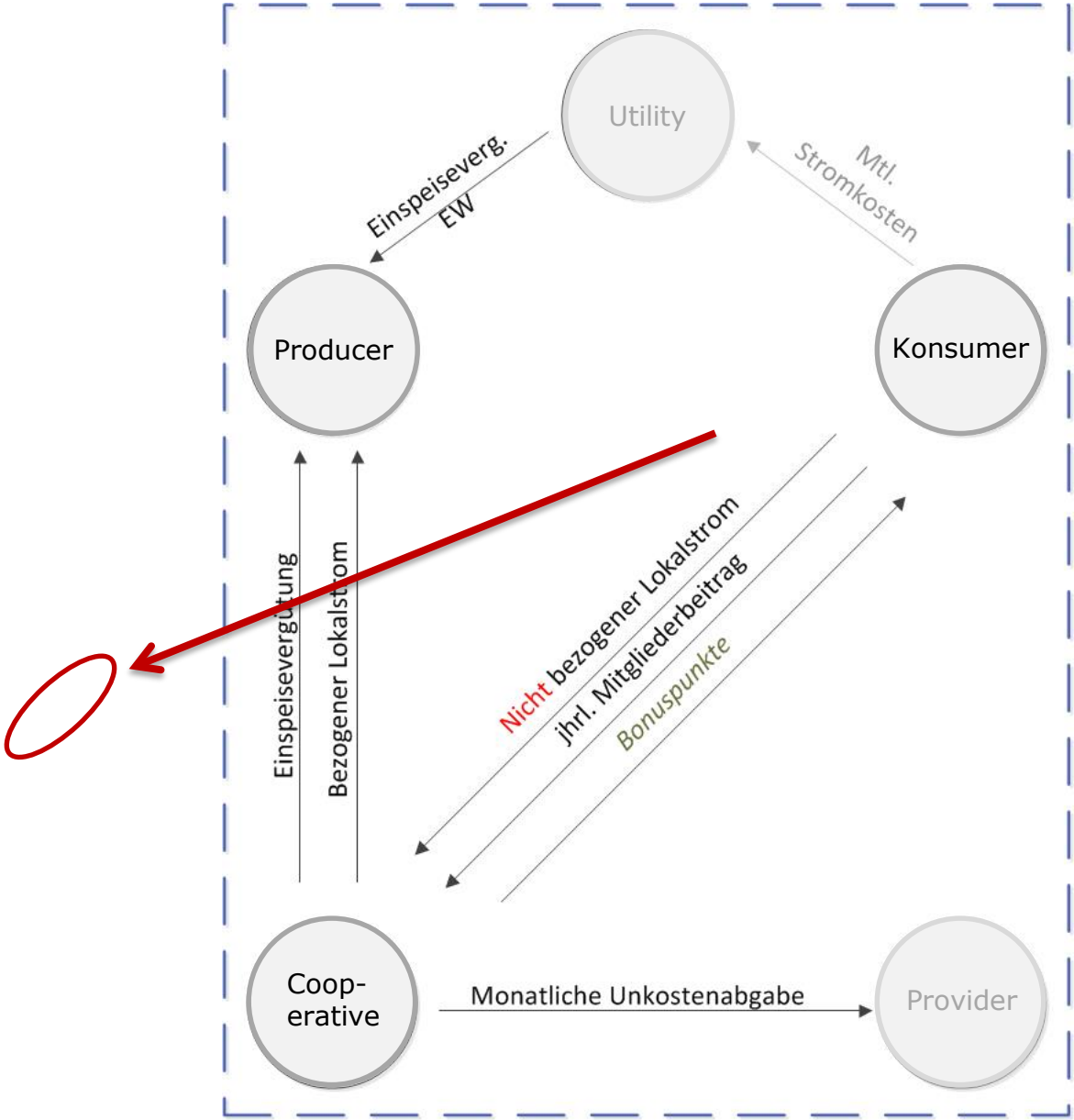
BM I



BM I

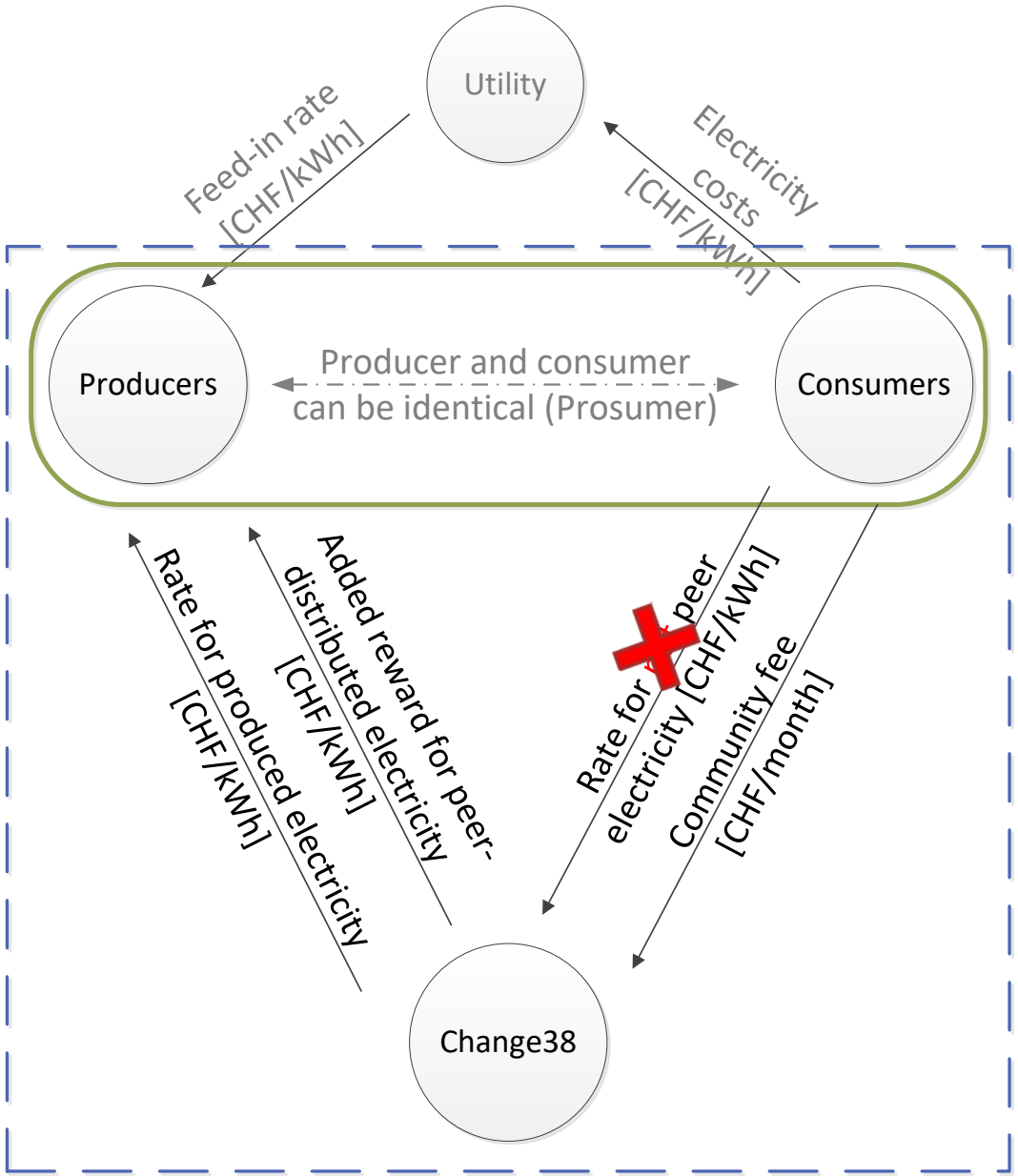


BM I


Utility
Einspeisevergütung EW
Mtl. Stromkosten
Producer
Konsumer
Einspeisevergütung
Bezogener Lokalstrom
Nicht bezogener Lokalstrom
jhrl. Mitgliederbeitrag
Bonuspunkte
Coop-erative
Monatliche Unkostenabgabe
Provider


Geschäftsmodell

BM II


Utility
Feed-in rate [CHF/kWh]
Electricity costs [CHF/kWh]
Producers
Producer and consumer can be identical (Prosumer)
Consumers
Rate for produced electricity [CHF/kWh]
Added reward for peer-distributed electricity [CHF/kWh]
Rate for peer electricity [CHF/kWh]
Community fee [CHF/month]
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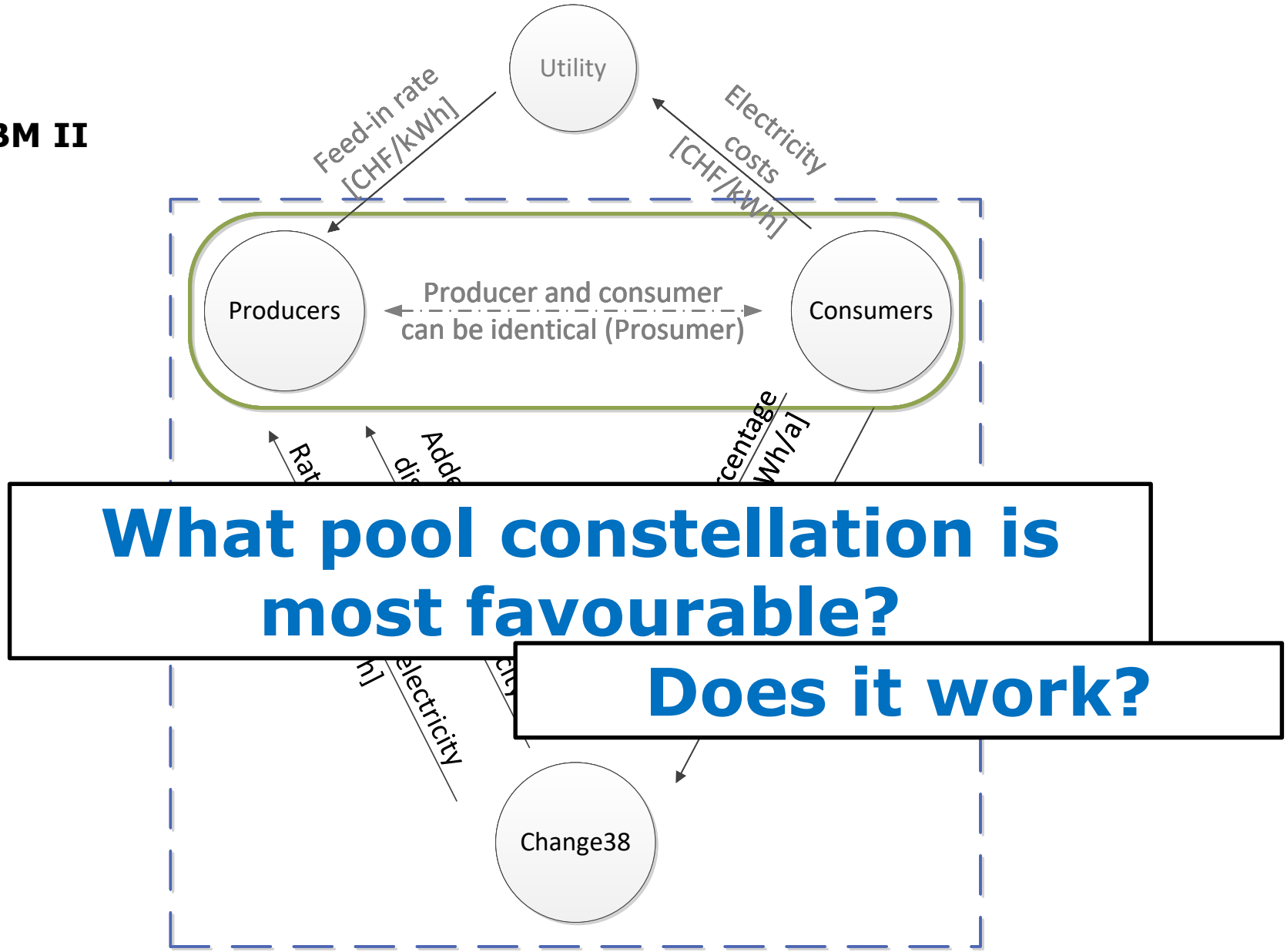
BM II



What pool constellation is most favourable?

Does it work?

Offers to consumers

- **Choice** of producer
- **Create own Energy-Mix**
- **Rewards** ecologically behaviour
- **Ecological contribution** without detriment
- **Interaction** and **Steering** of **Appliances** with app
- **Live-measurement** and **visualization** of own consumption.

Offers to producers

- Less and less KEV
- Lower and lower feed-in tarifs.

- Producer receives:

- **Basic comission** for each produced kWh

- **Bonus comission** for simultaneously produced and consumed kWh

- **Comission** for consumer recruitment

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SIMULATIONS

Main approach

1. *Modelling:* Develop a framework to simulate any constellation
2. *Simulation*: Compare 2000 random pool constellations

Criteria:

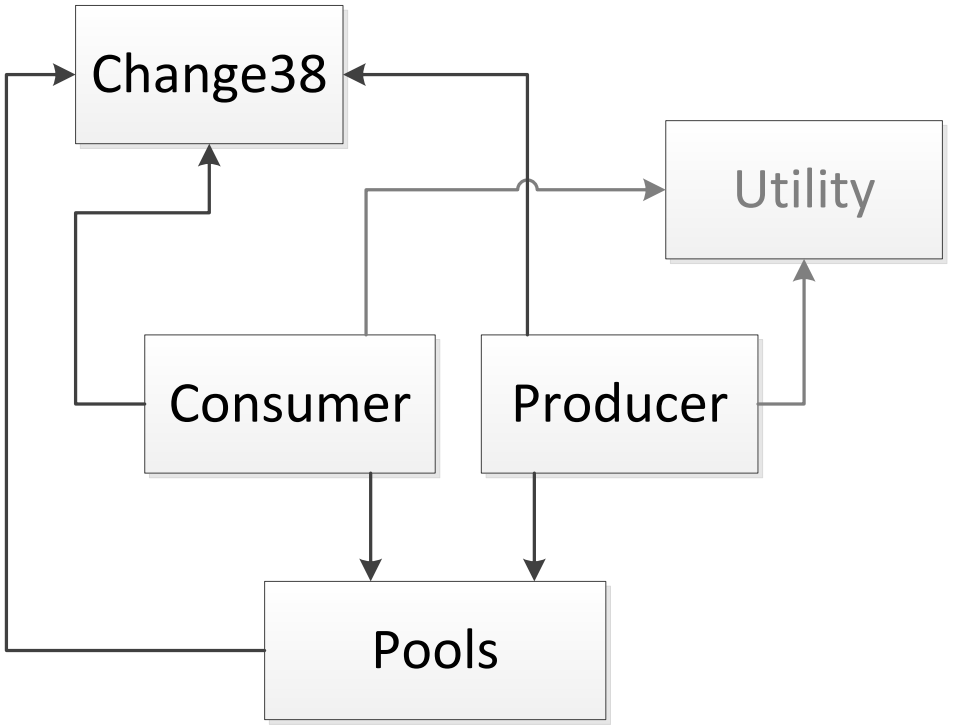
Costs:

- **Tenable costs** for consumer
- **Financial gain** for producers and Change38

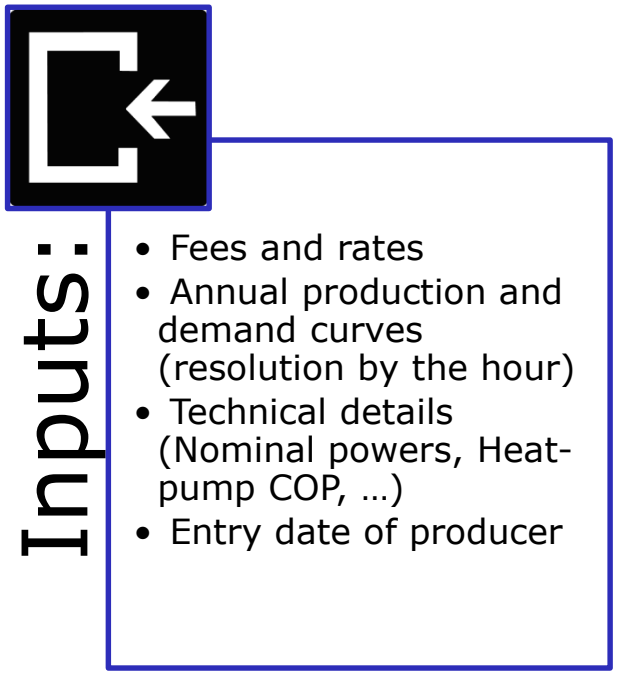
Environmental:

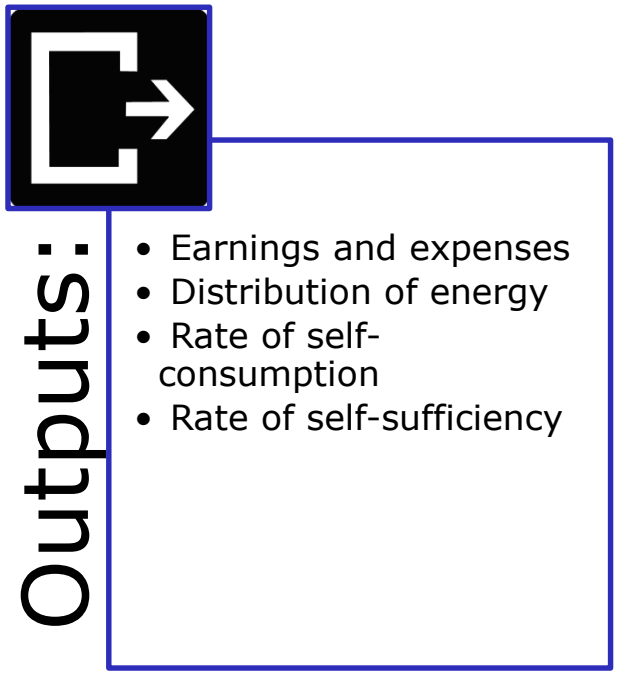
- **No overproduction** within pool
- High rate of **self-consumption**
- High rate of **self-sufficiency** (autarchy)

Simulation framework

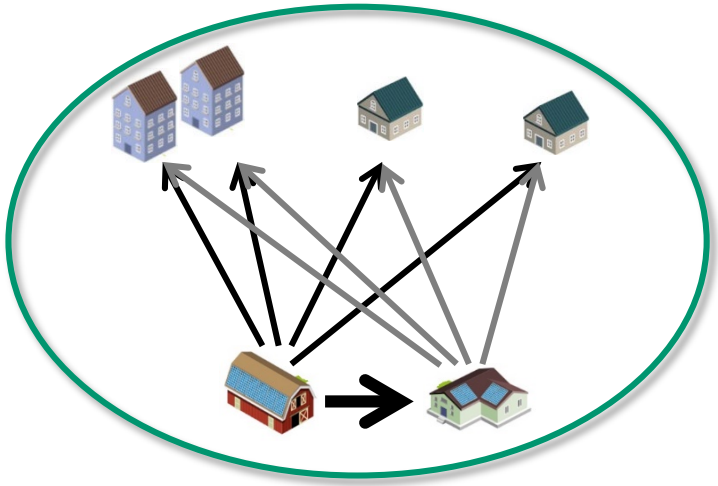


Simulation framework





MC – Simulations



X 2000

only

Findings…

- 4.2 – 24 Rp/kWh [Ø 12.7 Rp/kWh]

- 3.4 – 10.5 Rp/kWh

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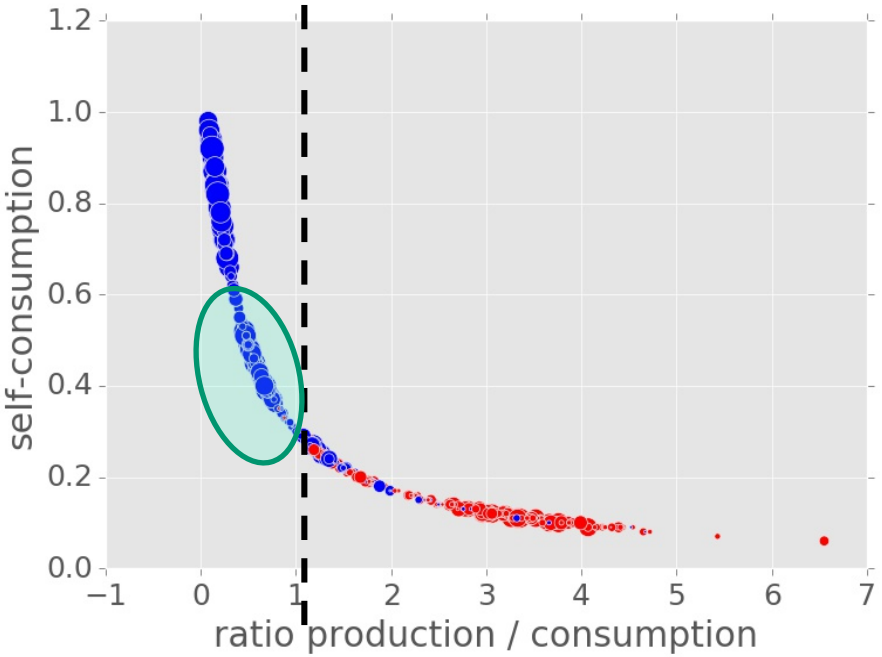
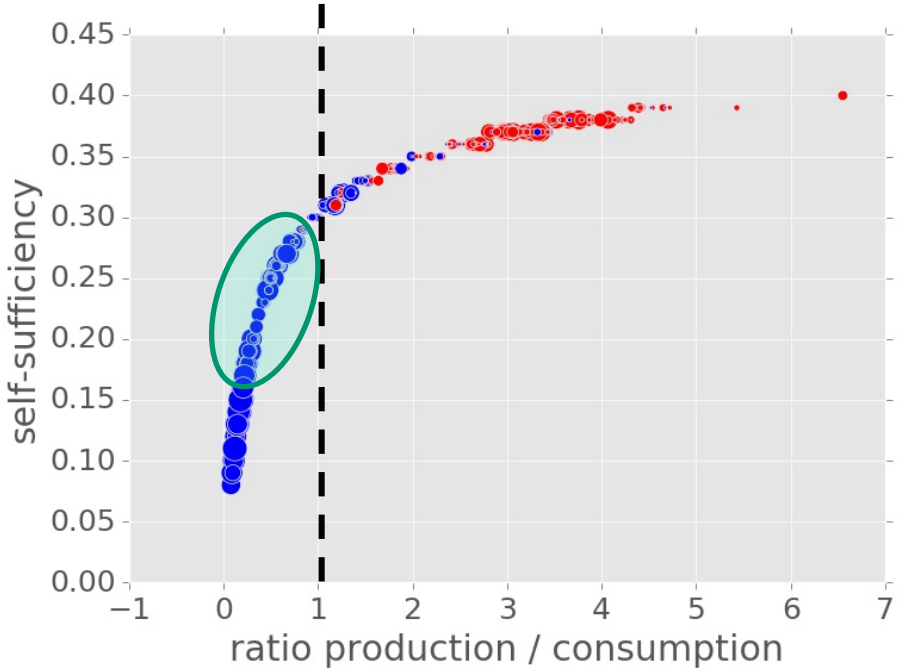
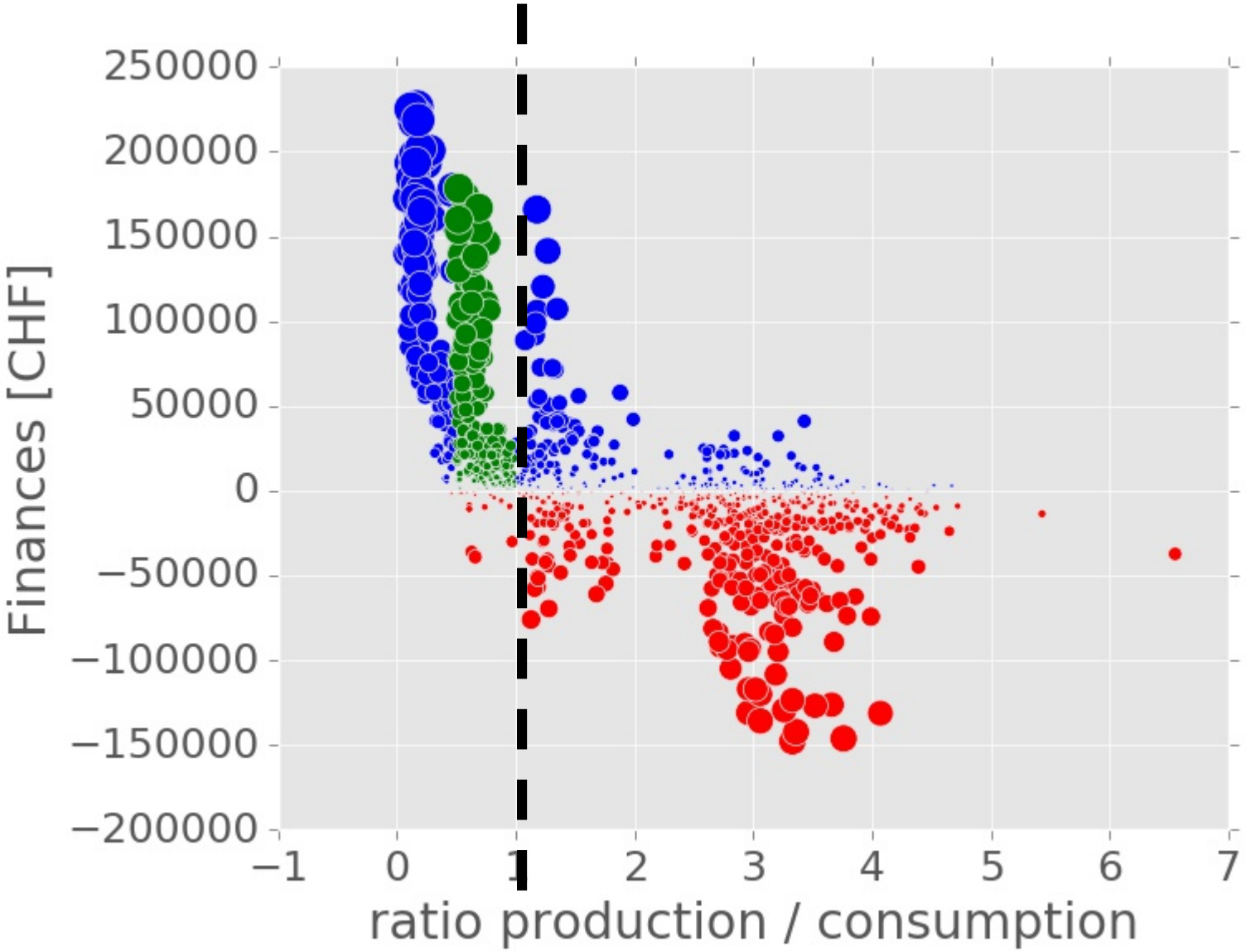
- + / -

Systems behaviour and analysis

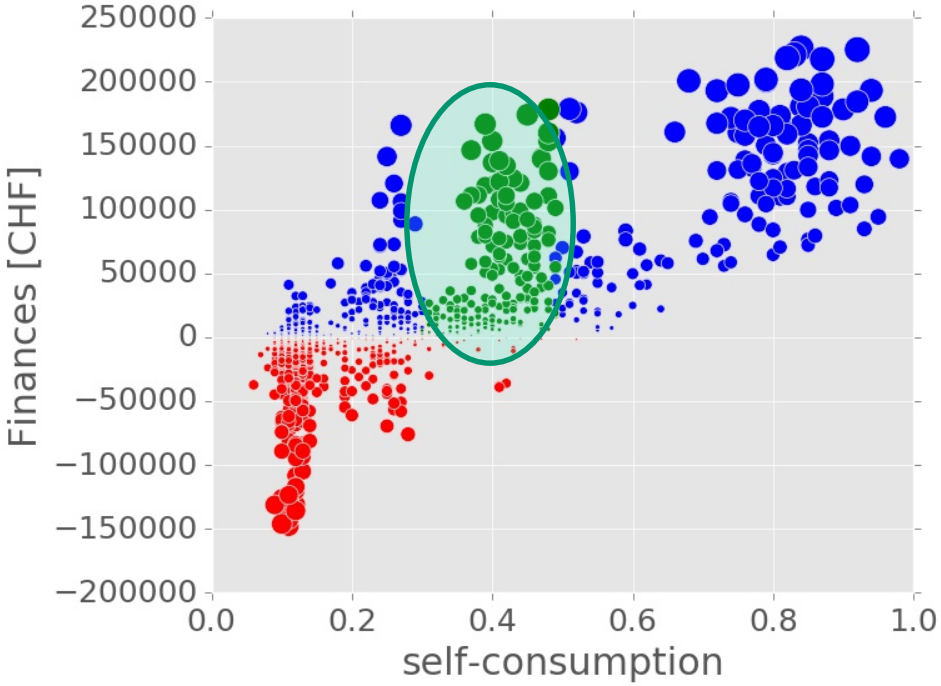


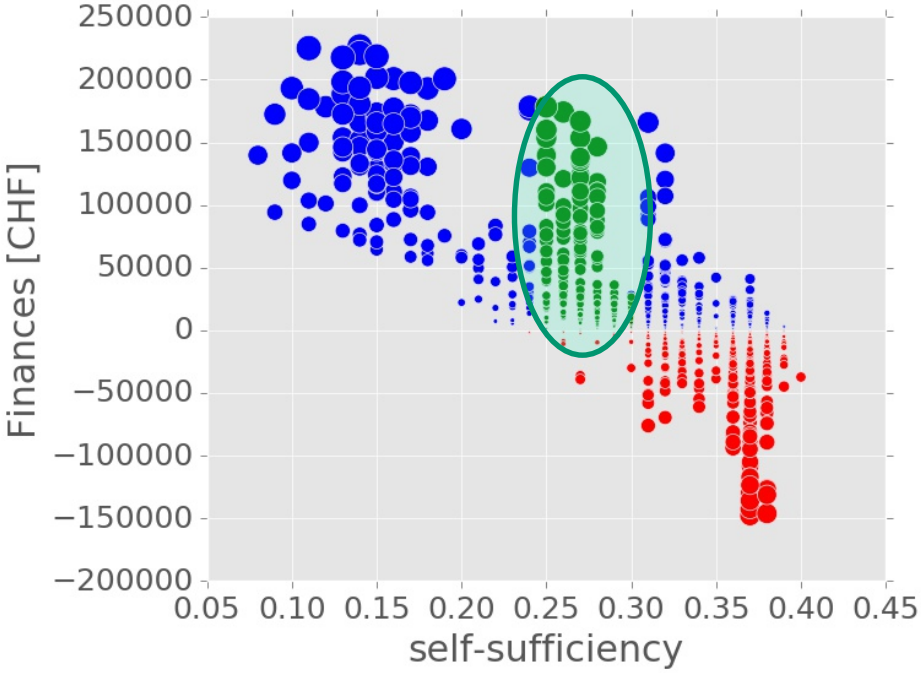


- No overproduction
- High rate of self-consumption **AND**
- High rate of self-sufficiency


250000
200000
150000
100000
50000
0
−50000
−100000
−150000
−200000
Finances [CHF]
−1
0
1
2
3
4
5
6
7
ratio production / consumption

Possible pool performances





- Self-consumption: 30% - 50%
- Self-sufficiency: 25% - 30%

Summary

- Business-Model functional for right pool constellations
- Antagonizing behaviour between self-sufficiency and self-consumption (due to pure PV-pools)
- Conflict of interest:
  Monetarization for Change38 ←→ Balancing of pools
- Need of a “critical mass” of consumers
- BM sensitive to financial parameters

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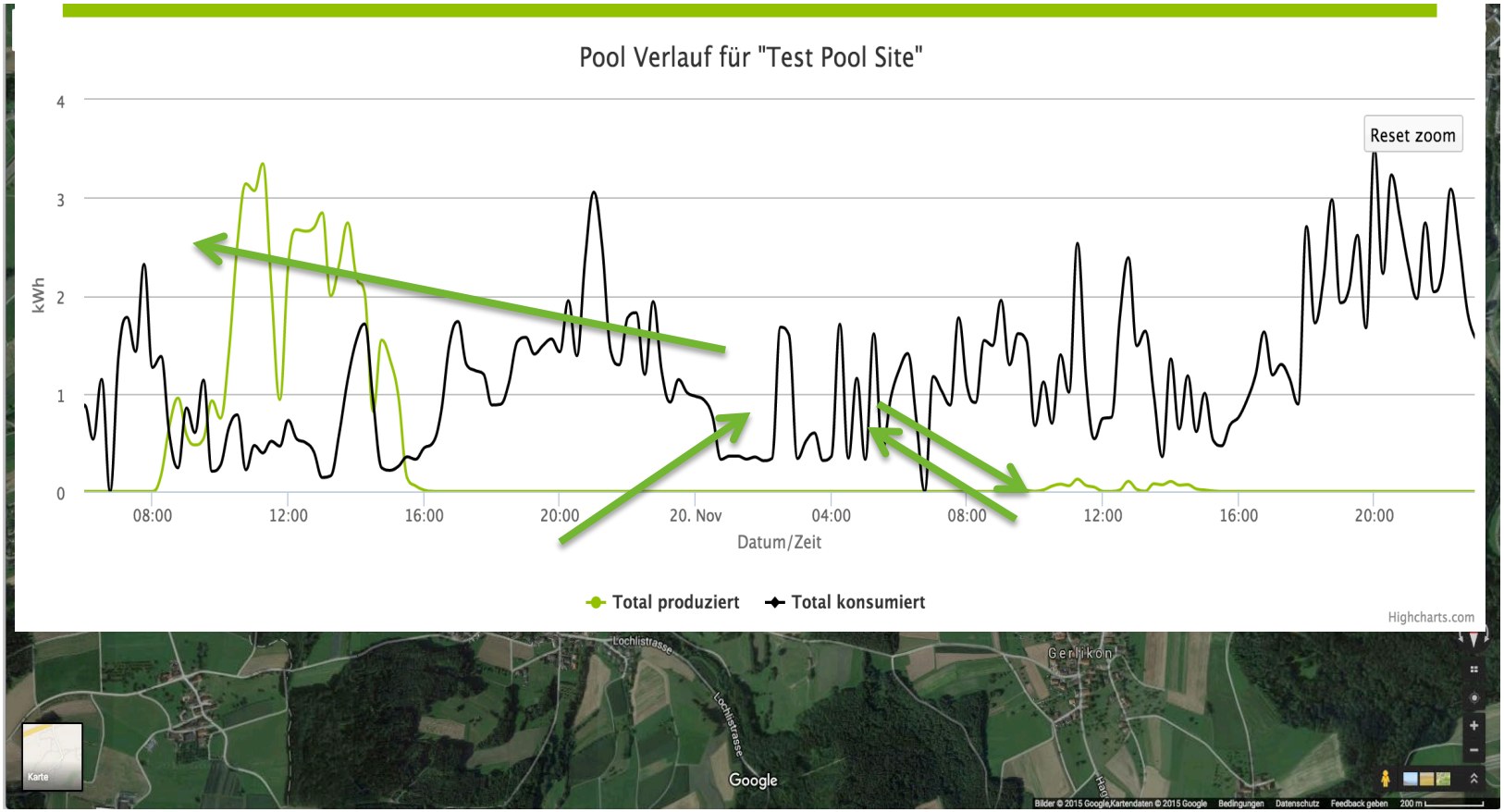
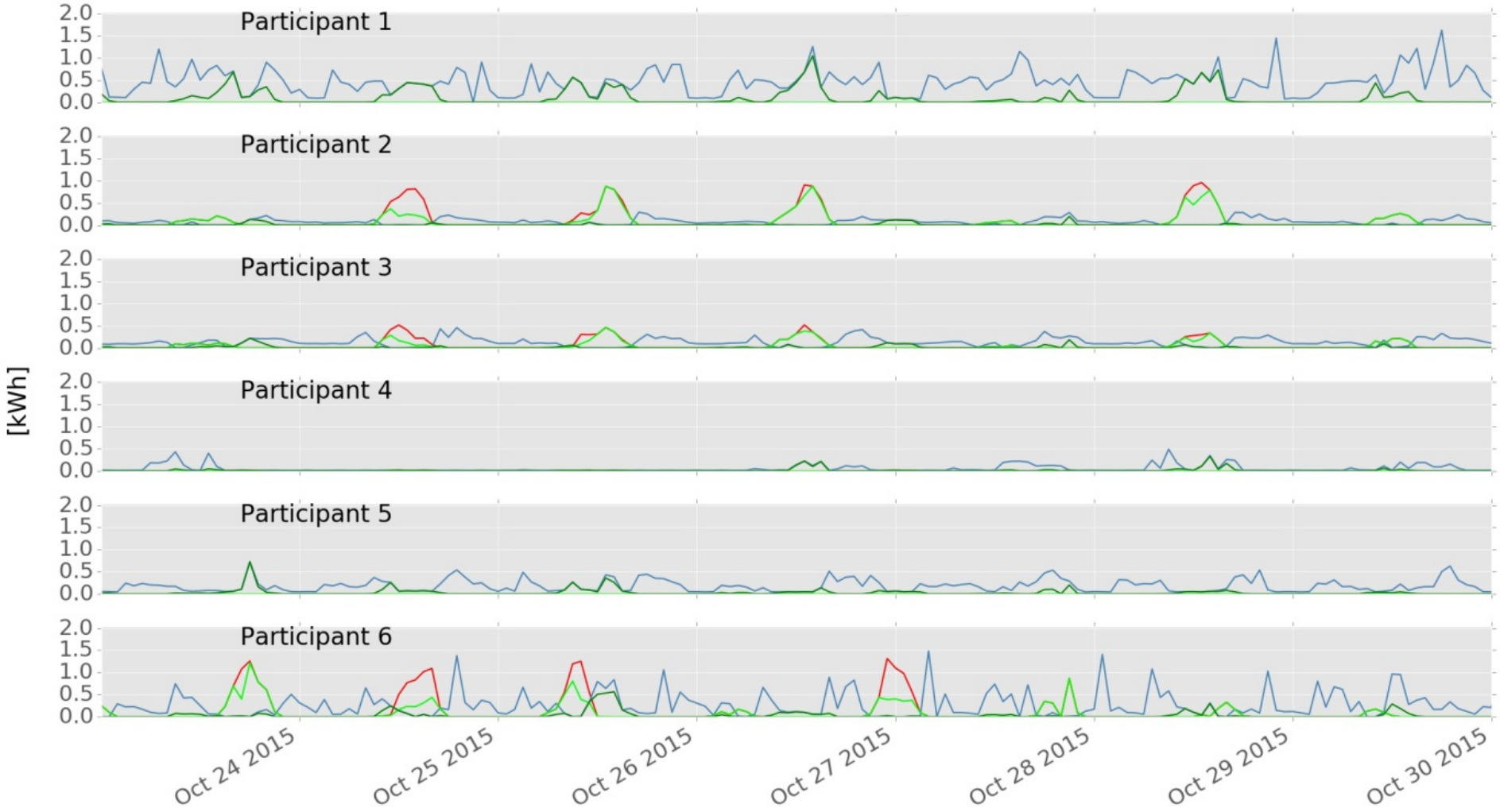
MEASUREMENTS

Pilot Gachnang – first data



A clip from the data

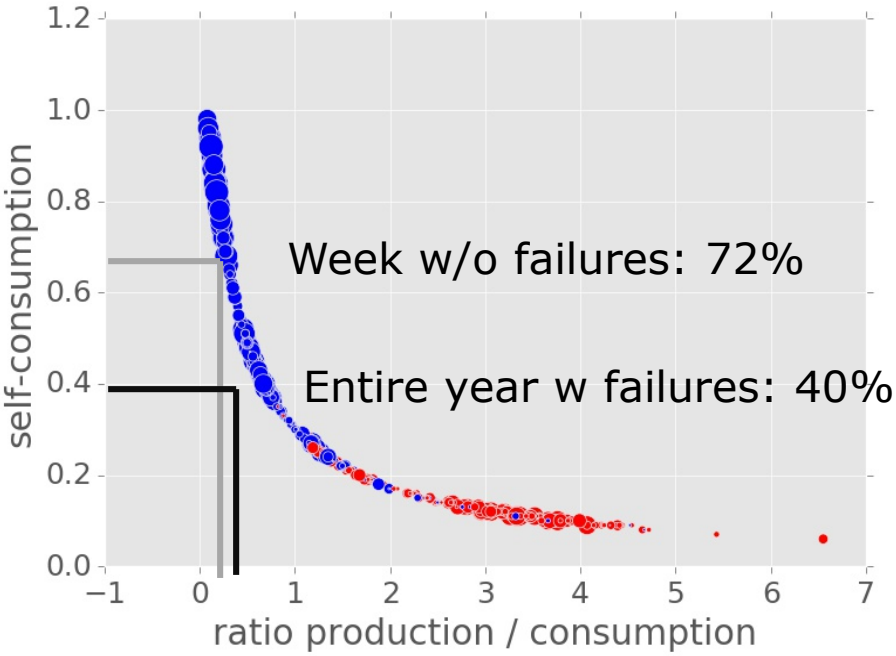


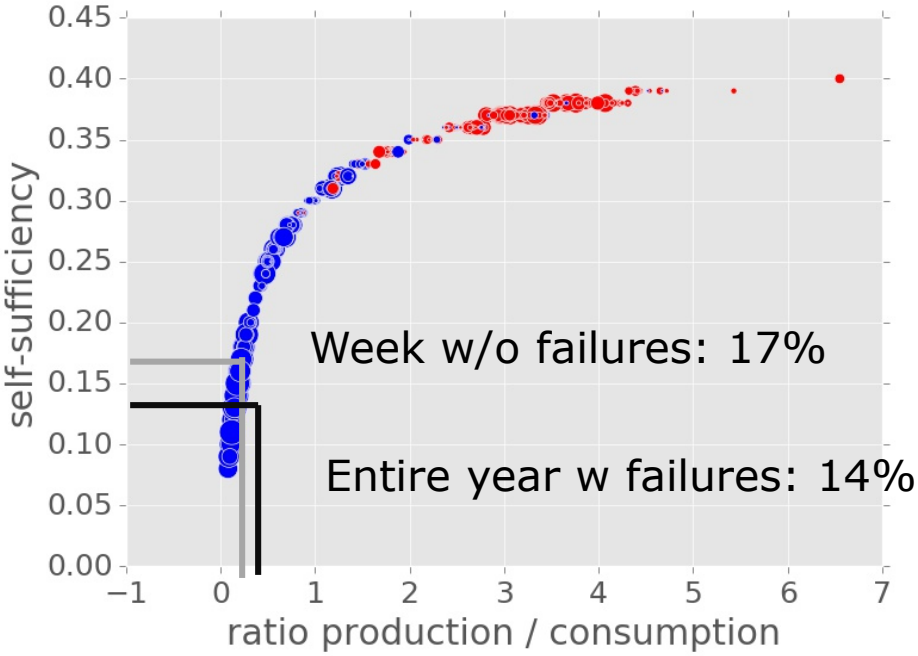
The data

- Two years of measurements.
- Only PV.
- Pilot, i.e. many missing datapoints.
- A few weeks w/o any missing data points.

How does it compare to the MC – simulations?

-





- Indicators **coherent**
- Chosen week w/o failures **perfect** match
- Entire Dataset lies **nearby**

Technological diversification necessary!!

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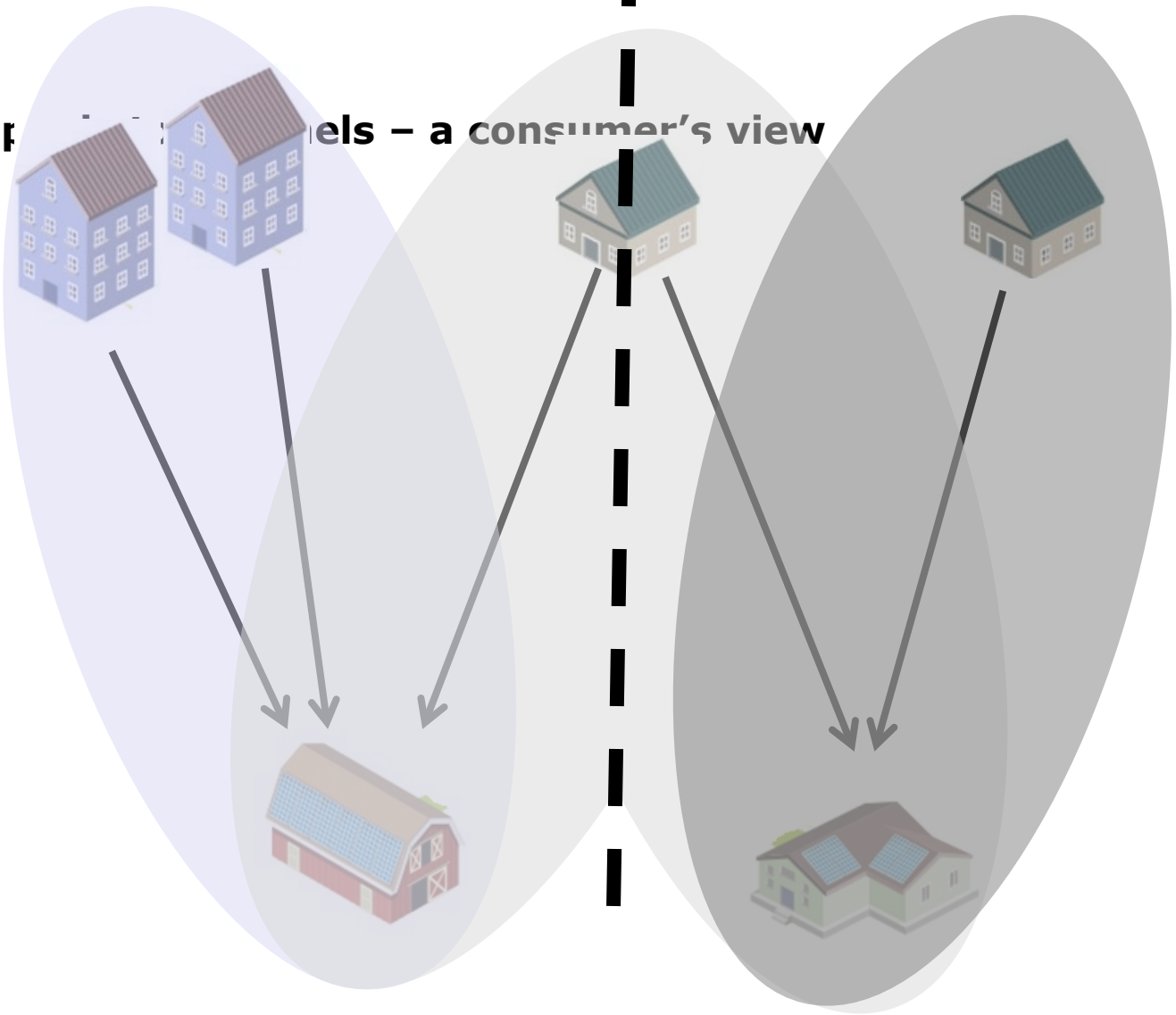
HOW DID IT CONTINUE?

From p[illegible]els – a consumer's view



User's experience

Consumer (me) books channel from model family

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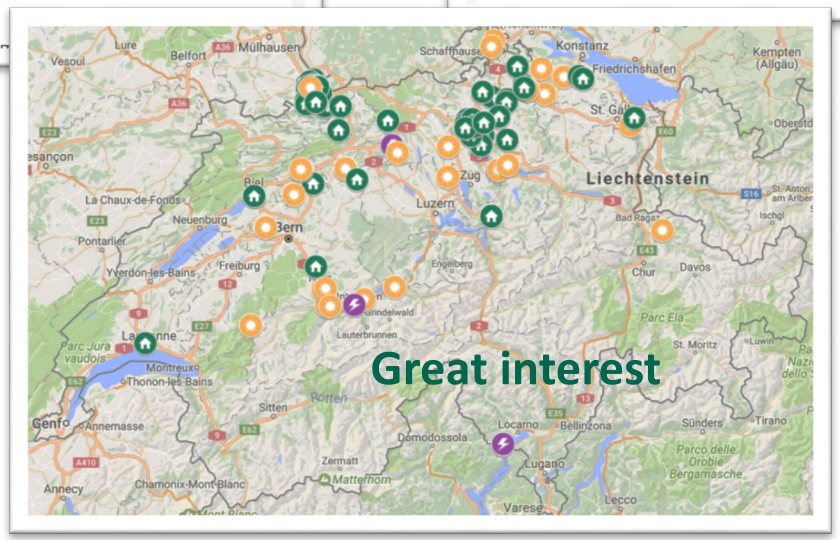
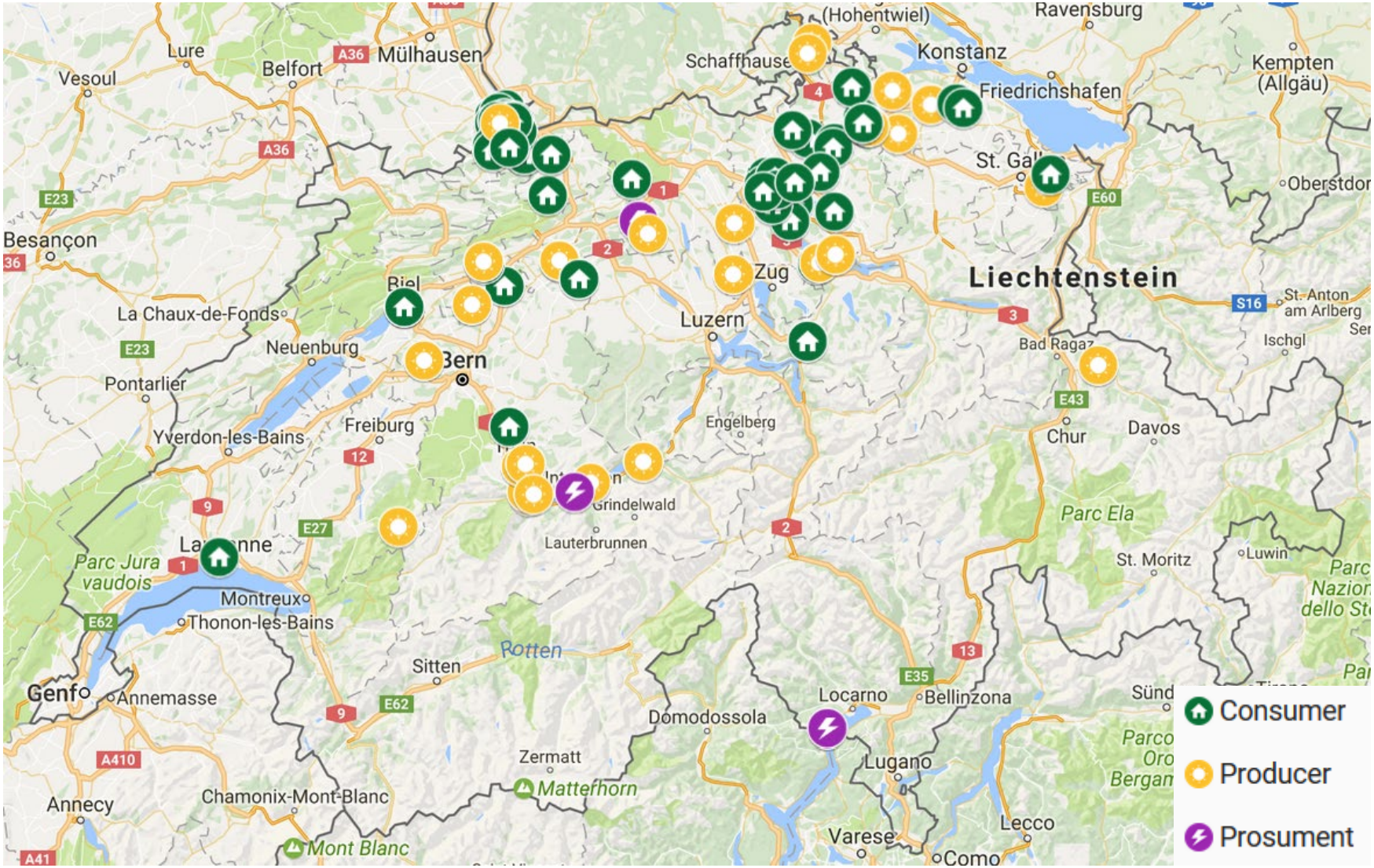
Change38 started well



Interests...


(Hohentwiel)
Ravensburg
Konstanz
Kempten (Allgäu)
Friedrichshafen
Schaffhausen
Mülhausen
Belfort
Vesoul
Lure
St. Gallen
Oberstdorf
Besançon
Zug
Liechtenstein
Luzern
Biel
La Chaux-de-Fonds
Neuenburg
Bern
Pontarlier
Yverdon-les-Bains
Freiburg
Engelberg
Bad Ragaz
St. Anton am Arlberg
Ischgl
Chur
Davos
Grindelwald
Lauterbrunnen
Parc Ela
St. Moritz
Luwin
Parc Jura vaudois
Montreux
Thonon-les-Bains
Rotten
Sitten
Genf
Annemasse
Locarno
Bellinzona
Domodossola
Zermatt
Matterhorn
Lugano
Chamonix-Mont-Blanc
Annecy
Mont Blanc
Varese
Lecco
Como
Consumer
Producer
Prosument

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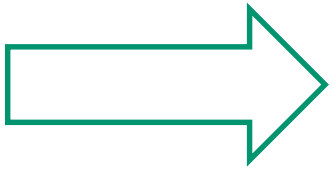
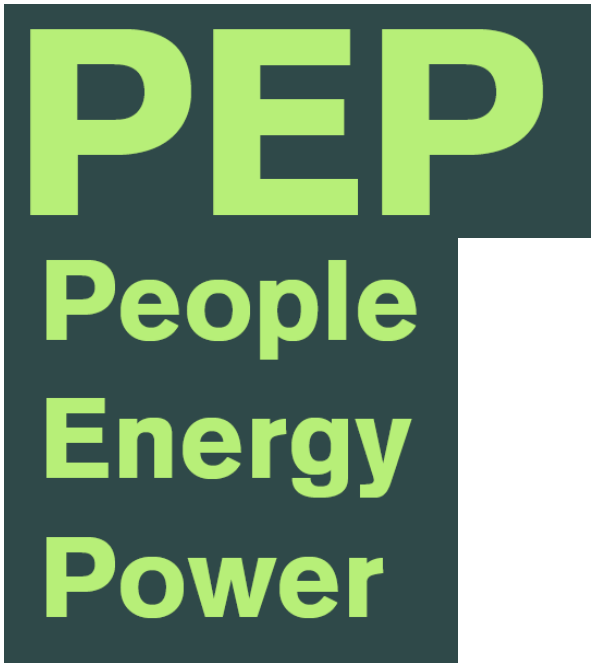
WHAT'S NEXT?

Change38 changes...

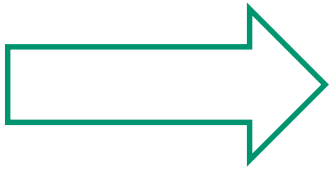
- the name

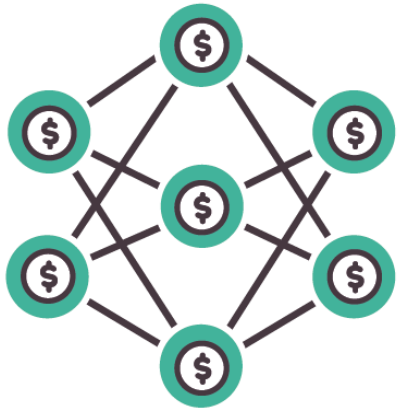




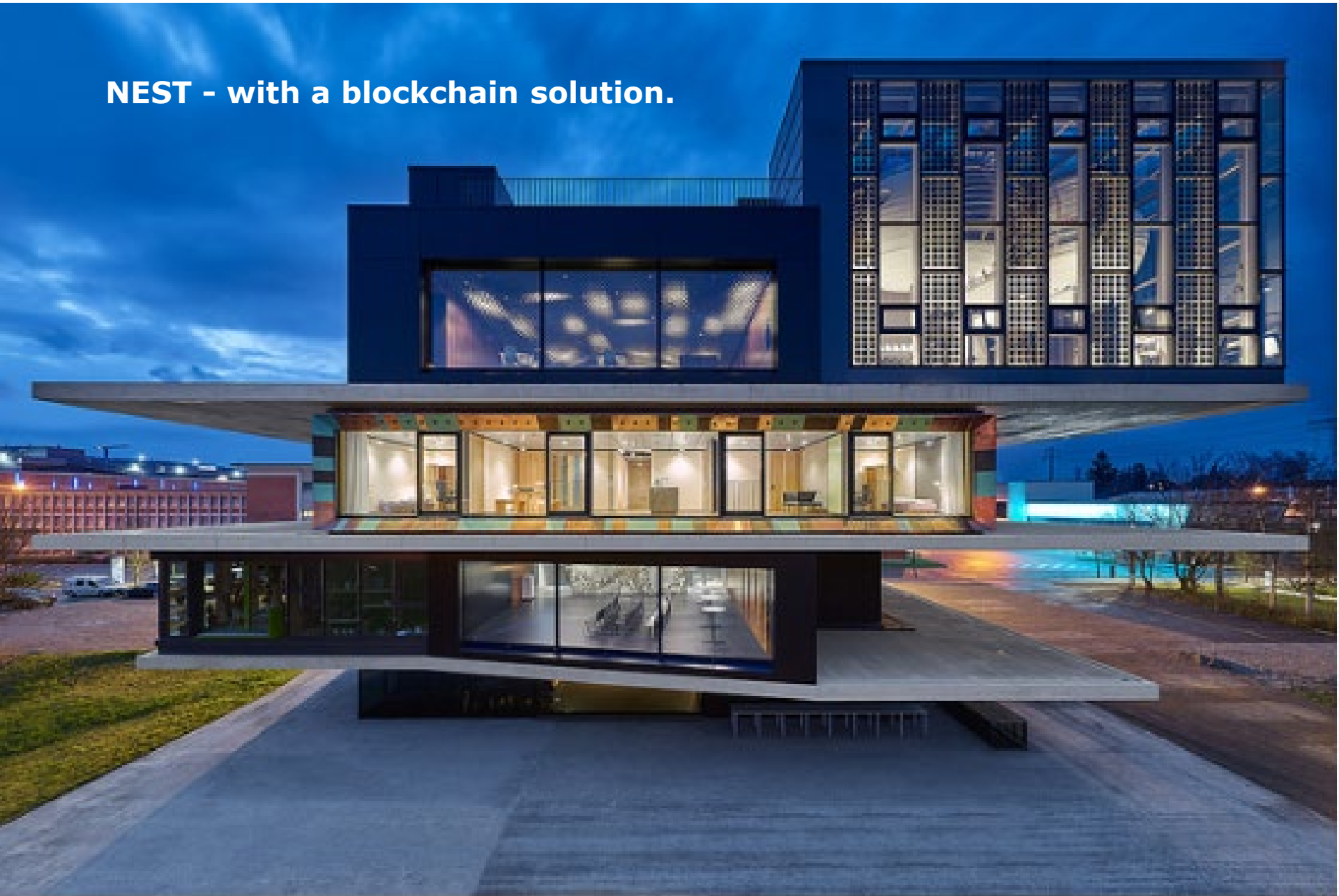
Change38 changes...

- the technology





NEST - with a blockchain solution.

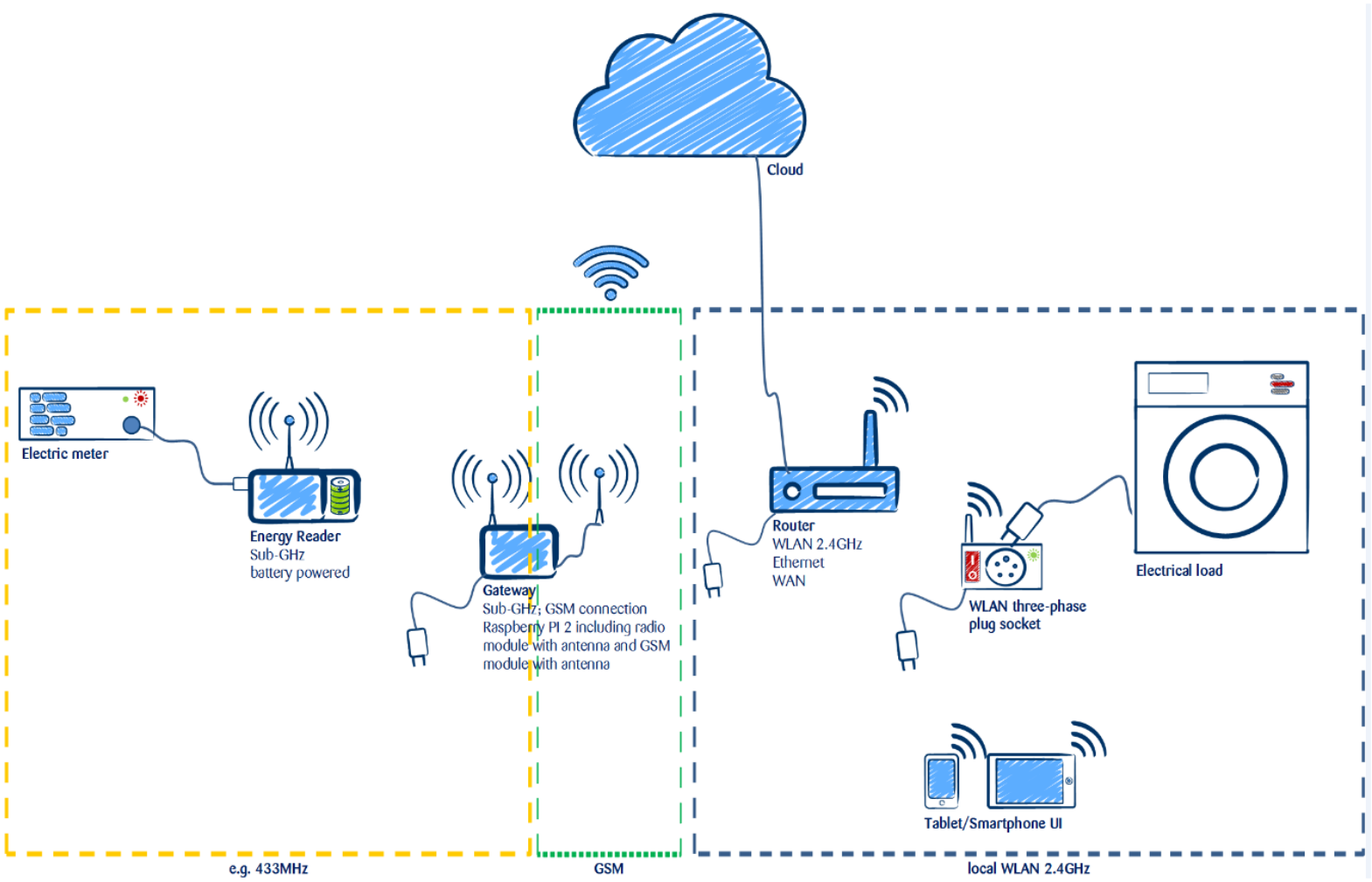


…then the world.


Thank you!


BACKUP

Systemübersicht Energy-Center



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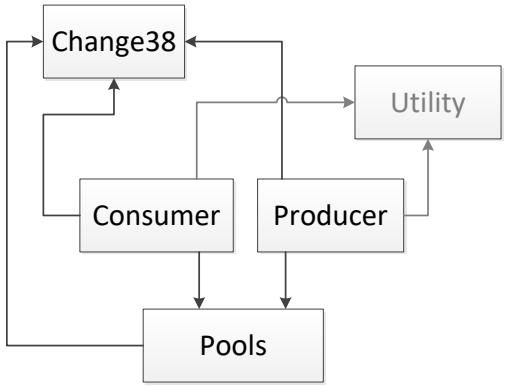
UNSER BEITRAG

Beitrag der HSLU (ZIG + LUCCERNE)

- **Umfragen** zu (HSLU – LUCCERNE):
  - Akzeptanz des Geschäftsmodells
  - Präferenzen
  - weitere Wünsche

- Entwicklung eines **Simulations-Frameworks** zu den Geschäftsmodellen (HSLU – ZIG), um:
  - Szenarien abzubilden und zu variieren
    - Preise/Raten
    - Nutzerkonstellationen
  - Geschäftsfälle zu erforschen und zu entwickeln
  - Die Geschäftsmodelle zu prüfen



Resultate im Abriss…

- Generell **positives Umfrageergebnis**:
  - + Stromherkunft
  - + Freie Wahl der Produzenten, Transparenz
  - + Grünstrom zum Vorteilspreis und Malus für Graustrom
  - – Vergleich zwischen den Teilnehmern

- **Vielversprechende Simulationsresultate**:
  - + Konsumenten zahlen ca. 20.-CHF/Monat
  - + Produzenten erhöhen ihre Einspeisevergütung des EWs um >100%
  - - «Kritische Masse» benötigt, damit Change38 rentabel ist.

Acknowledgement

In cooperation with the CTI

Energy
Swiss Competence Centers for Energy Research

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Commission for Technology and Innovation CTI

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