Lucerne University of
Applied Sciences and Arts

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Matching renewable energy production and consumption by market regulated demand site management (DSM)

Research and Development
Center for Integrated Building Technology
Thomas Schluck
Research Associate

T direct +41 41 349 38 48
thomas.schluck@hslu.ch

Horw 15/06/2016

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Motivation – the Swiss energy turnaround 2050

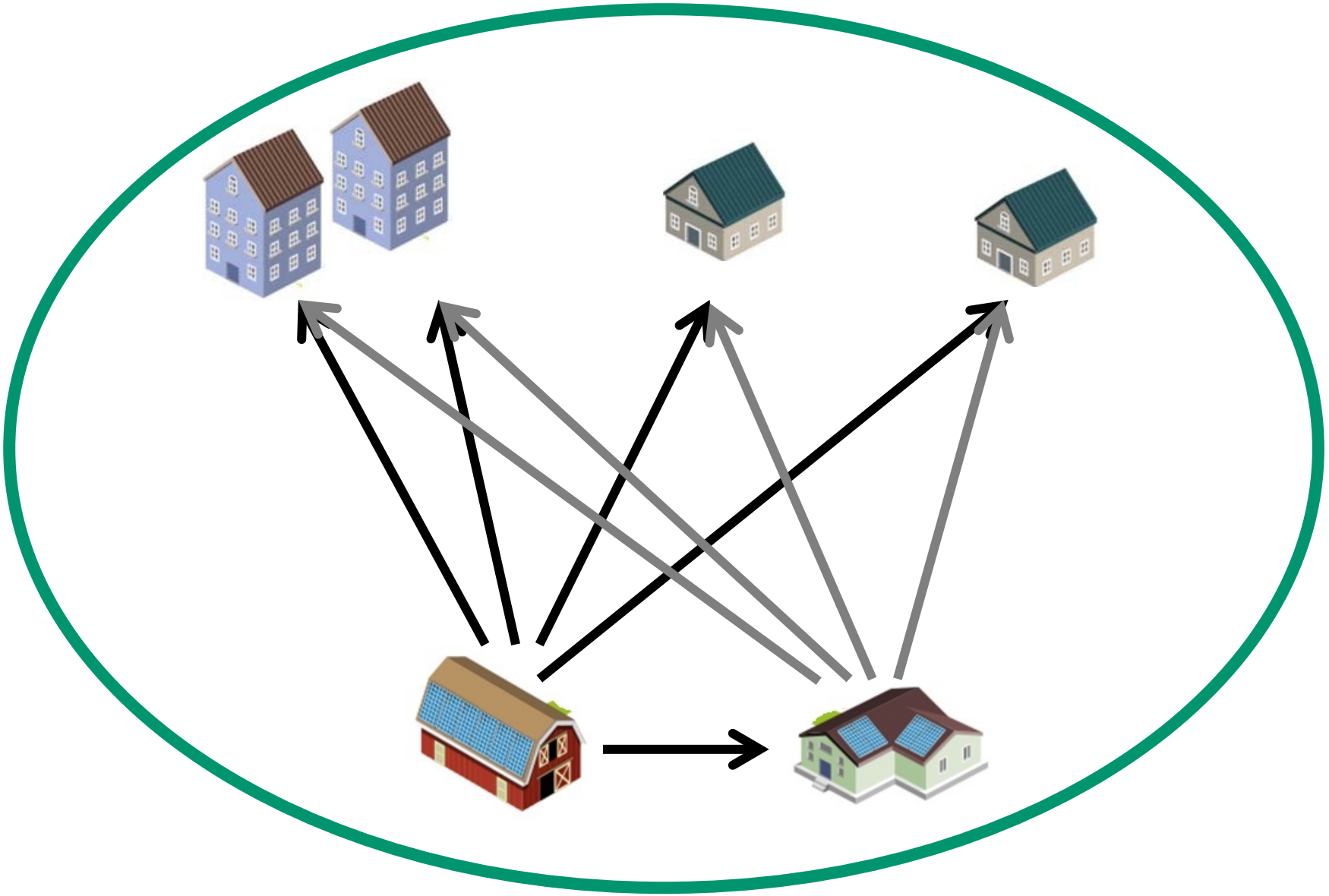
- MORE renewable energy sources

- MATCHING demand and production

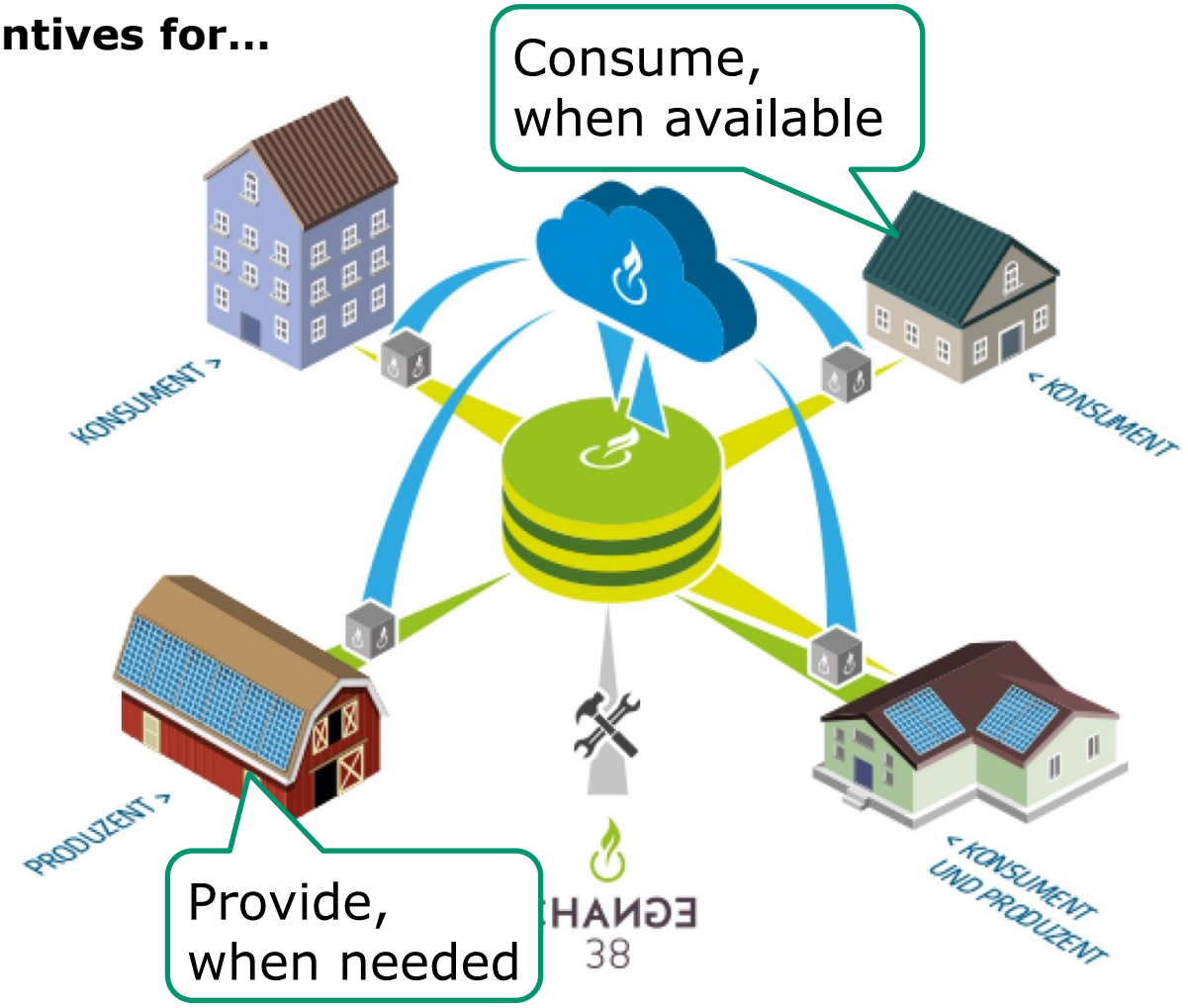
- HOW to INTEGRATE renewable energy systems?
  - technically
  - **economically**

Change38 – a market approach

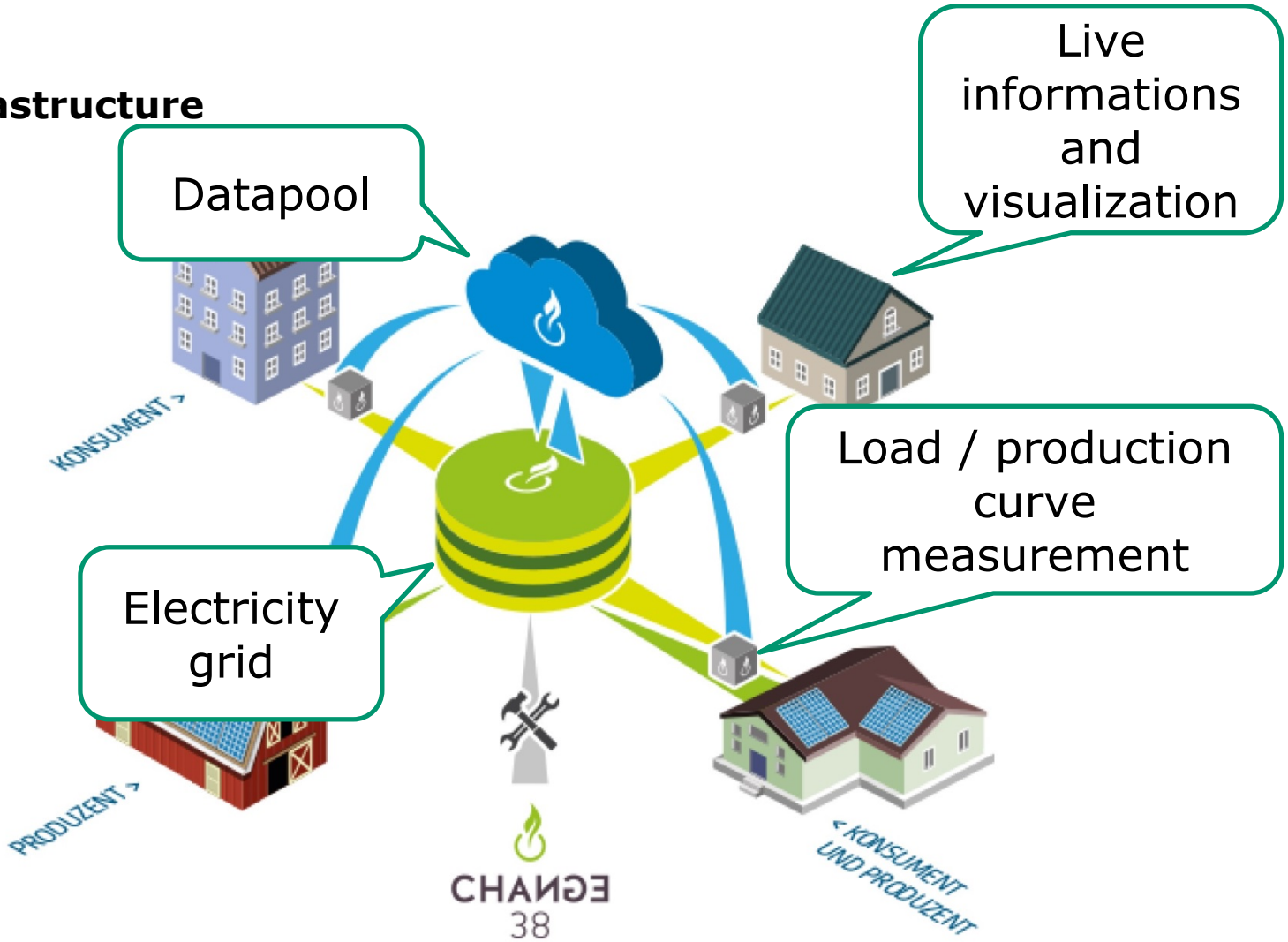
- Founded in 2013 by Robert Bühler:
- "The Energy turnaround within one generation."
- "Matching power and demand locally and in real-time."
- Push the consecutive addition of renewables
- Give a framework for a self-organized matching of demand and production



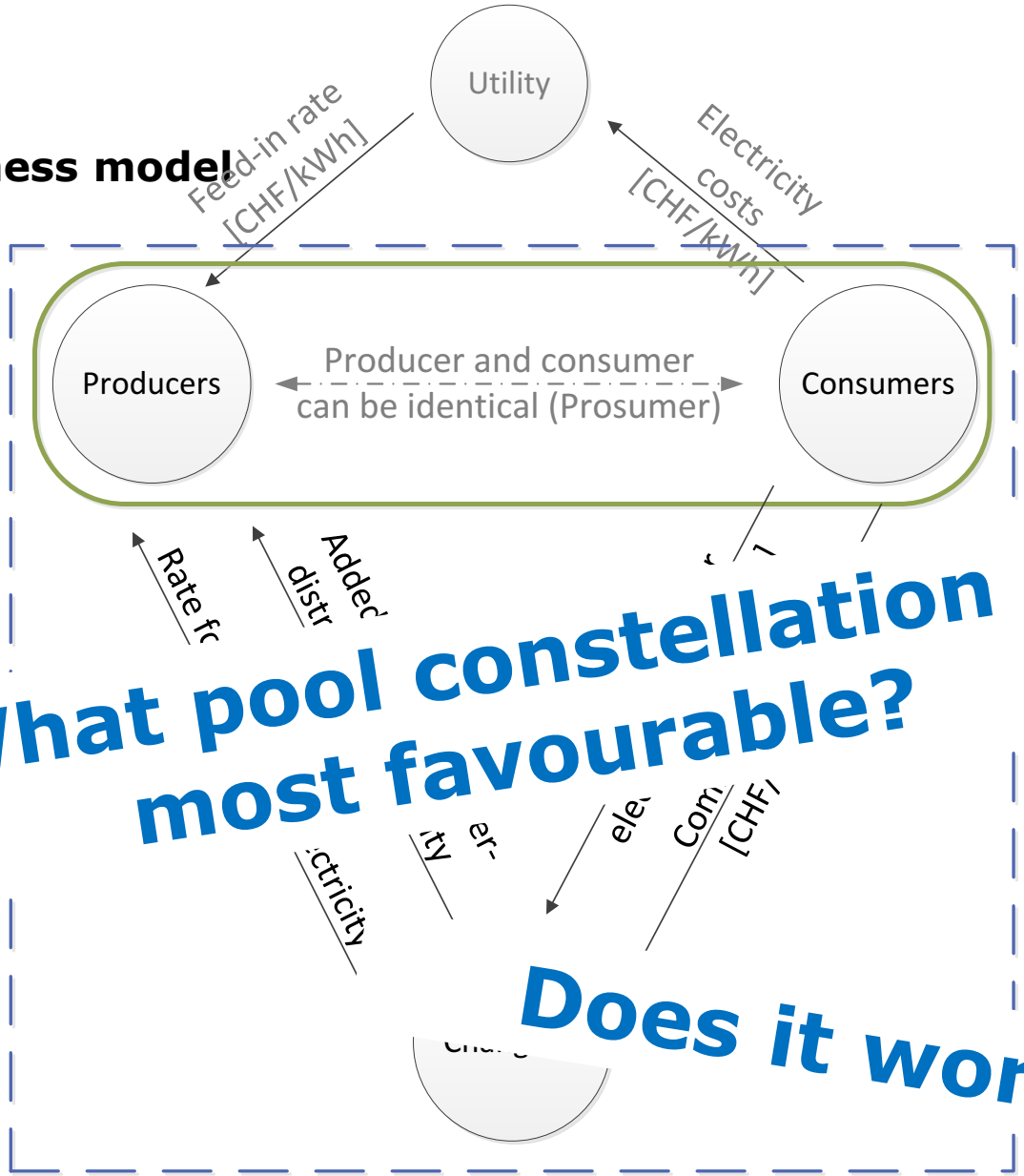
The idea:
Set incentives for…



The infrastructure



The business model



Main approach

1. *Modelling:* Develop a framework to simulate any constellation

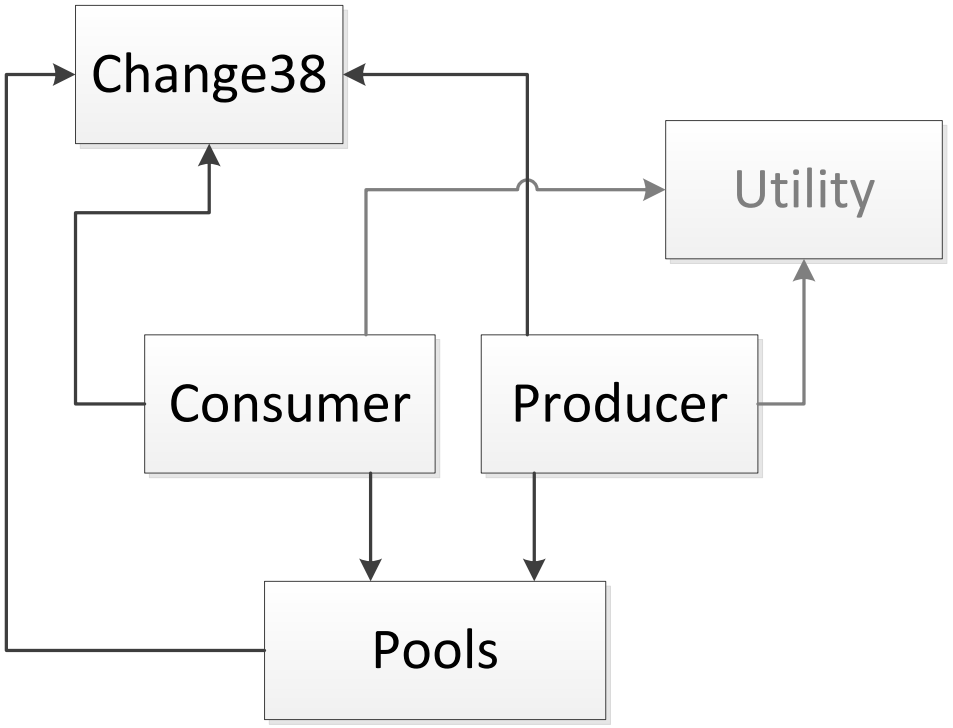
2. *Simulation*: Compare 2000 random pool constellations

Criteria

1. Costs:
   - Tenable costs for consumer
   - (High) financial gain for producers and Change38

2. Environmental:
   - No overproduction within pool
   - High rate of self-consumption
   - High rate of self-sufficiency (autarchy)

Simulation framework (1)



Simulation framework (2)

1. Inputs:
   - Fees and rates
   - Annual production and demand curves (resolution by the hour)
   - Technical details (Nominal powers, Heat-pump?)
   - Entry date of producer

2. Outputs:
   - Earnings and expenses
   - Distribution of energy
   - Rate of self-consumption
   - Rate of self-sufficiency

Simulations

- 2000 random pool constellations incl. parameter variations
- *Only PV productions* considered

First findings

- 4.2 – 24 Rp/kWh [Ø 12.7 Rp/kWh]

- 3.4 – 10.5 Rp/kWh

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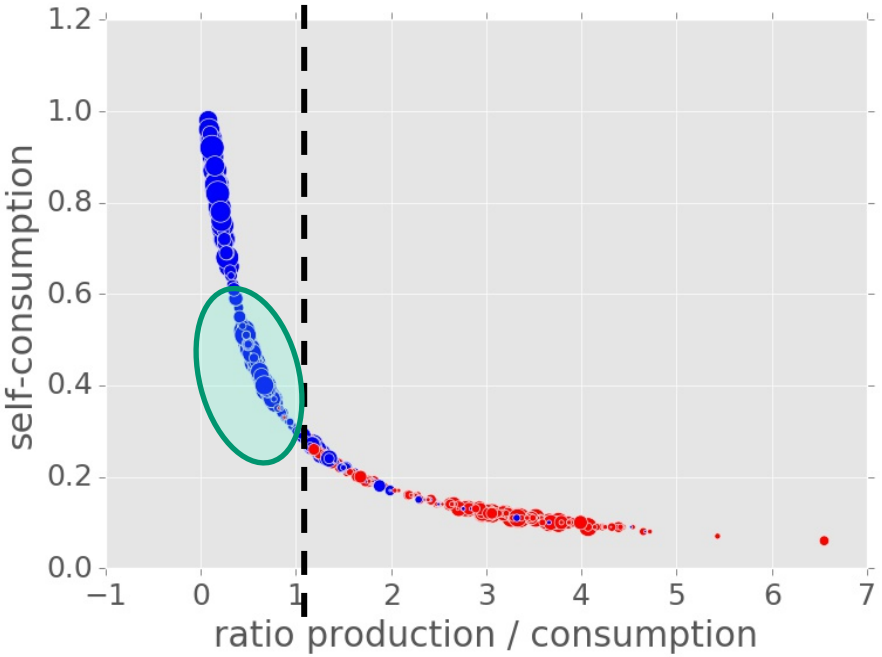
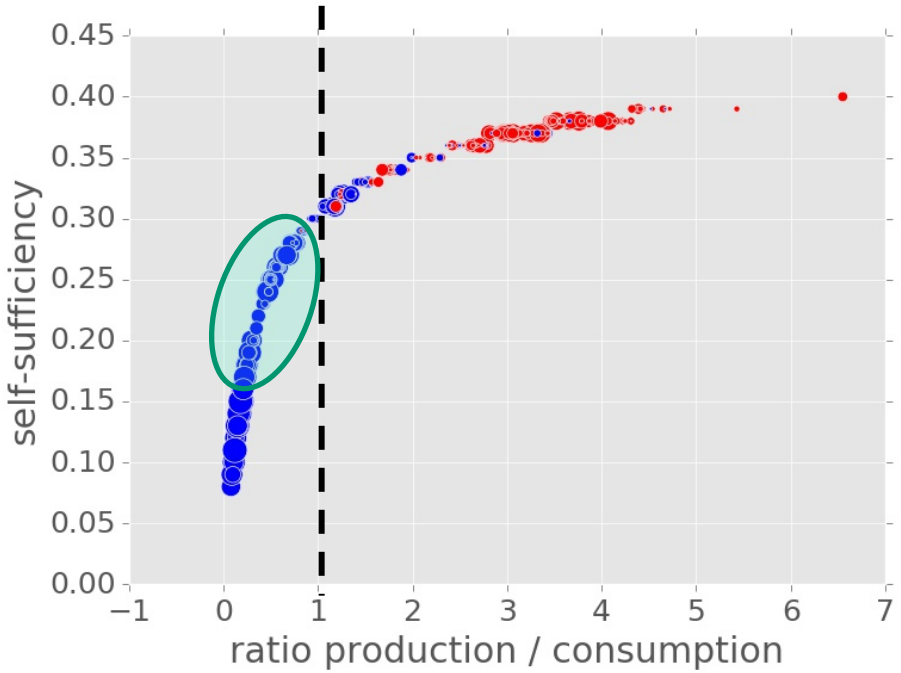
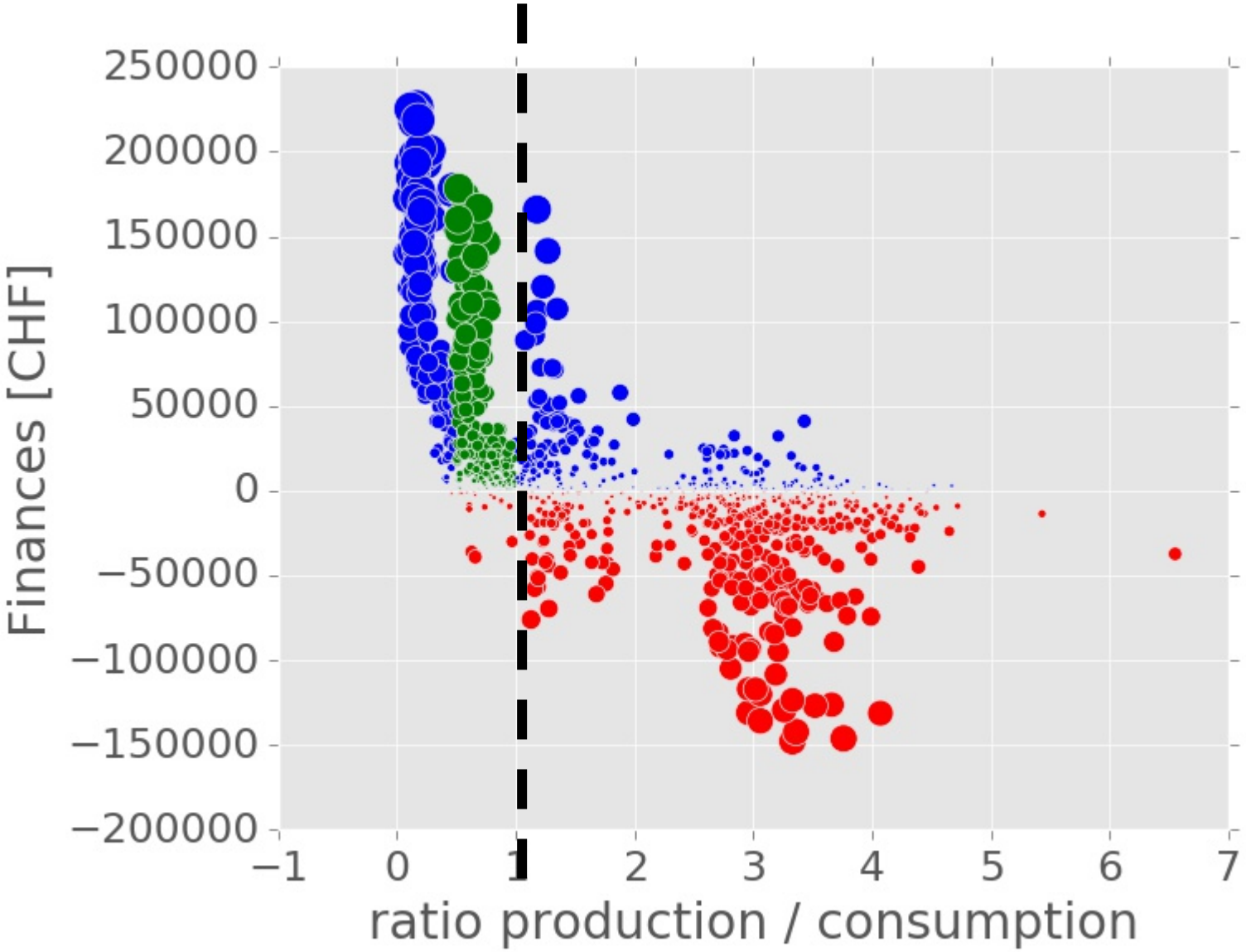
- + / -

Systems behaviour and analysis





- No overproduction
- High rate of self-consumption
- High rate of self-sufficiency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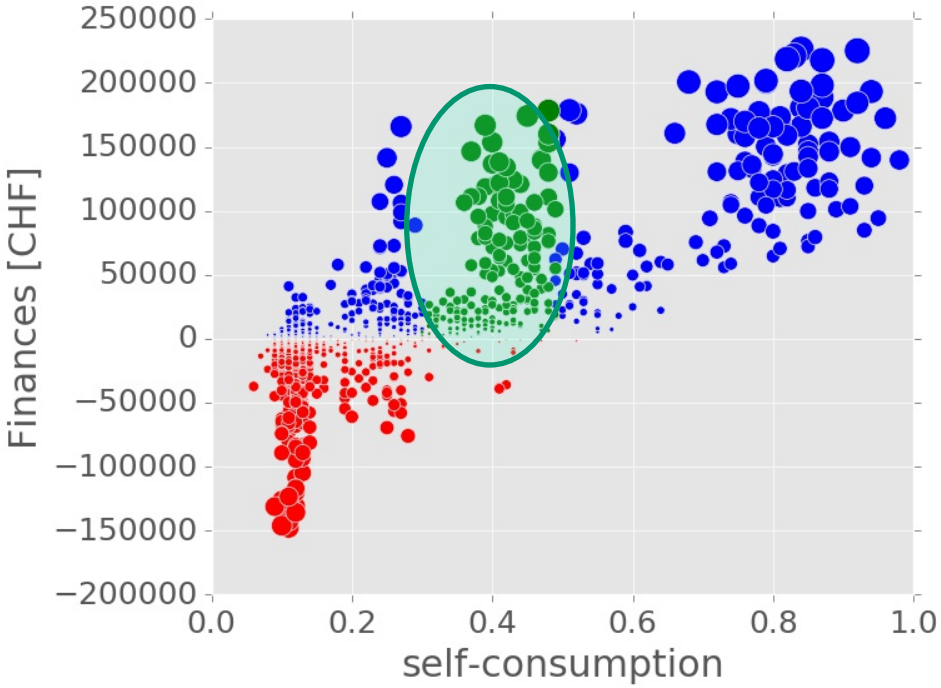
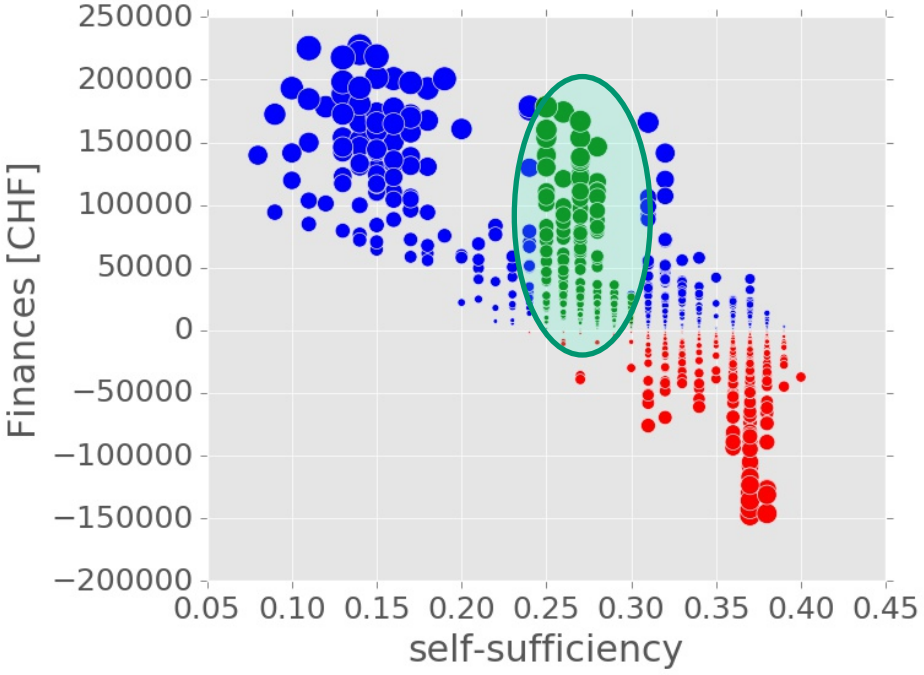
ratio production / consumption

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

Outlook

- Simulations taking different technologies into account
- Simulations on measured data.
- Consider customers behaviour?!

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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BACKUP