Blockchain Applications and Case Studies in District Energy and Power-to-Heat

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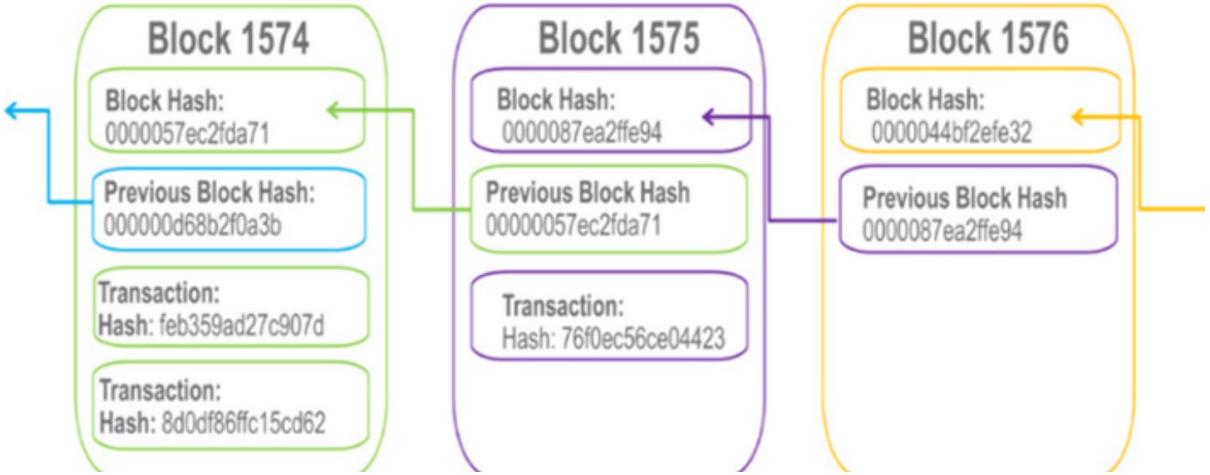
CONTENT

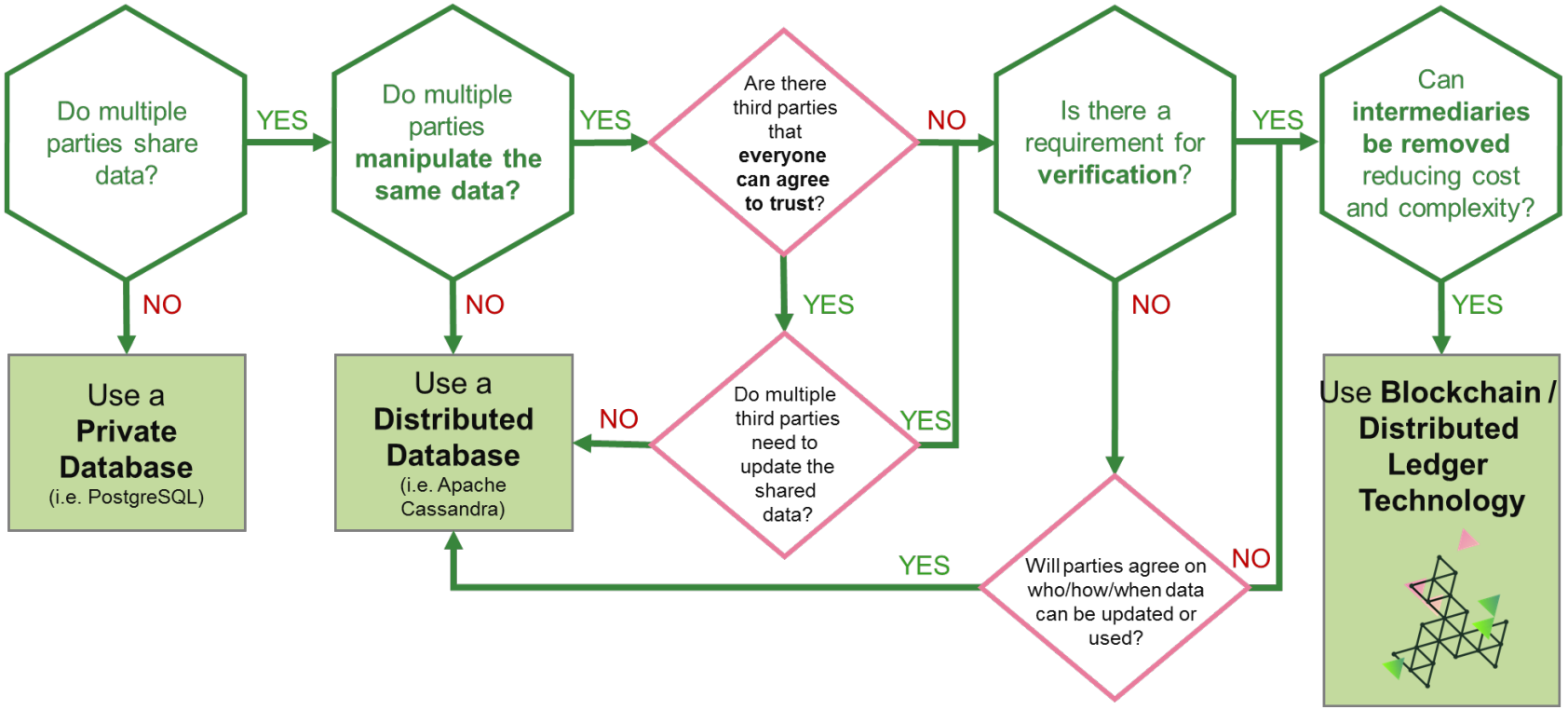
- Blockchain – a short (!) introduction
- The SonnWende+ Project
  - Invested use cases
- Use Case transparency for crowd-Invest
  - Concept
  - Advantages of the blockchain approach
  - Example
- Conclusion

WHAT IS BLOCKCHAIN?

- Blockchain is mostly known for its application in Bitcoin (and others)
- Blockchain is a distributed database (= “distributed ledger”)
  - shared and synchronized across a network.
  - not owned or controlled by one central authority,
  - everyone can access the full information and all the history.



WHEN TO USE A BLOCKCHAIN?



Source: Thomas Zeinzinger, lab10;
Original Source: https://www.slideshare.net/PabloJunco2/distributed-ledger-technology-dlt-beyond-blockchain-blockchainsubmit

THE SONNWENDE+ PROJECT

https://nachhaltigwirtschaften.at/en/sdz/projects/sonn-wende-plus.php

Efficient solutions for PV energy management based on block chain technology

- **Key facts**
  - **national funding (Stadt der Zukunft, 4. Ausschreibung)**
  - **Project run time: 10/2017 - 12/2019**
- **Aim:**
  - **Identify and specify concrete solutions for the use of Blockchain technology and check their feasibility**
  - **The design of selected use cases will be adjusted and a Blockchain-demonstrator will be implemented in the innovation-lab (Südburgenland, AT).**

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Investigated use cases and their application to district energy

transparency for crowd-Invest	crowd-investments into energy **infrastructures** (e.g. PV, heat pump) and continuous flowback of the revenues
energy ledger	collection of **digital points** that can be exchanged for various benefits, similar to “miles and more”. Earning point possible e.g. via efficiency measures
fully automatic charging	wireless **charging and payment** process for **electric vehicles**, based on conductive charging infrastructure
peer-to-peer trading	smart grid community: **producers and consumers** can **share resources** (PV electricity) among each other and with the energy supplier

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Focus of the presentation

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TRANSPARENCY FOR CROWD-INVEST

concept

1. **Building owners** provide roof areas / basement space
2. **Investors** provide the financial means
   - purchase + installation of e.g. PV panels and/or heat pumps
3. The **operator** (the intermediate between investor and building owner) is responsible for installation and billing.
4. Plant costs are **refinanced** via PV own consumption and surplus as well as reduced heating bills (heat pumps substituting former heating system)
5. Monthly billing based on actual own consumption / surplus → **Automated** monthly blockchain-based **payback** with interest to the investors
6. As soon as the system costs are covered, the PV system becomes the **property of the building owner**

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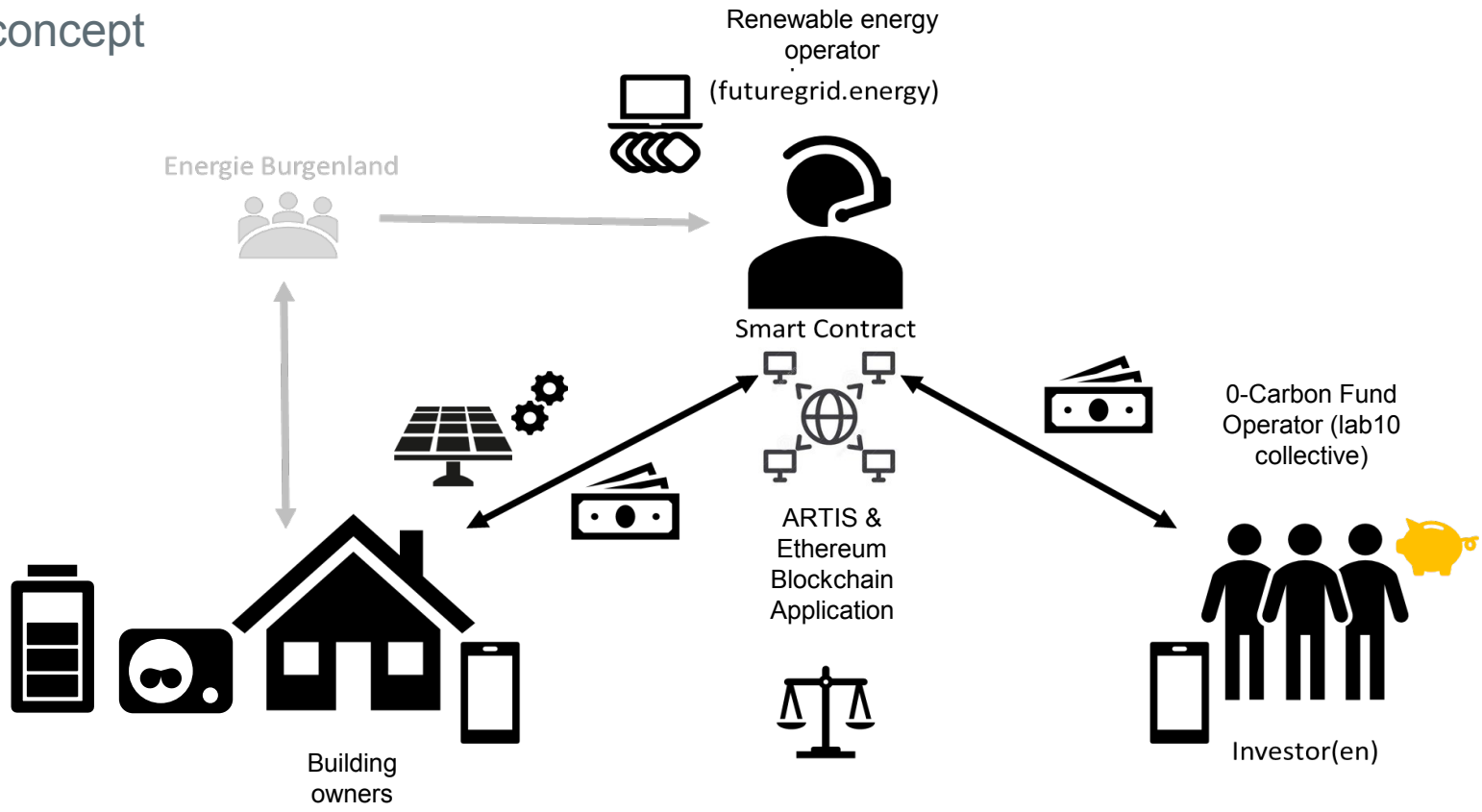
concept

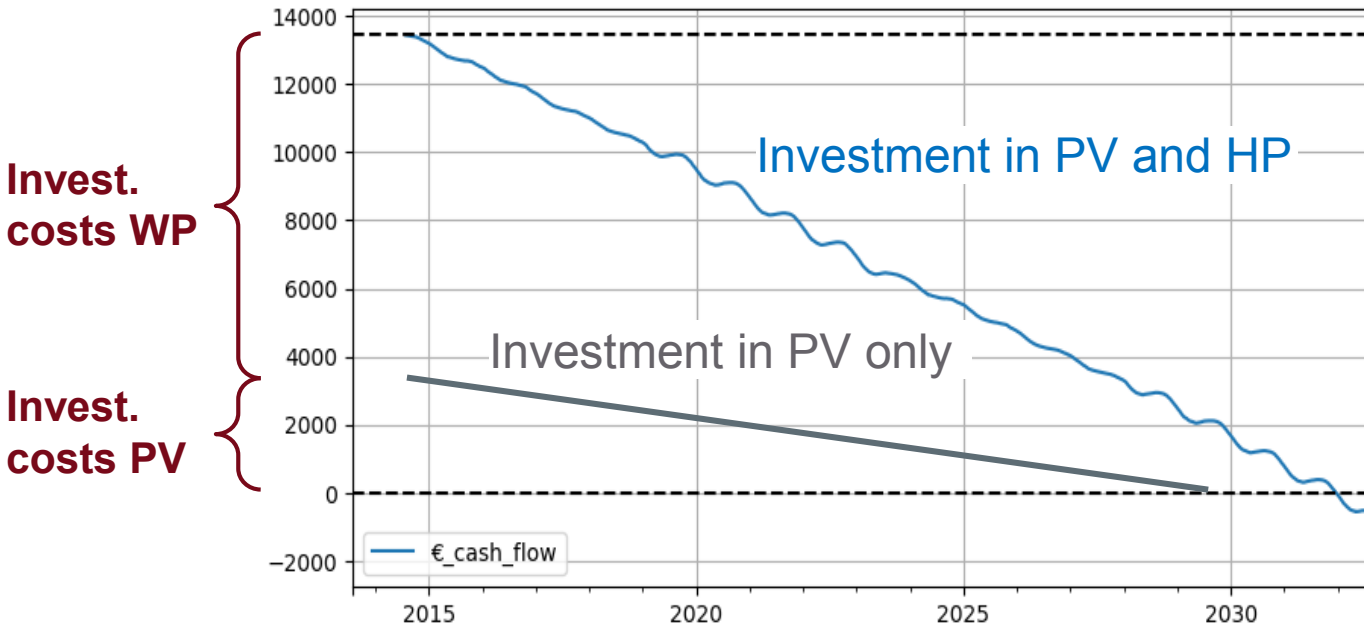


ADVANTAGES OF THE BLOCKCHAIN

- **Scalability** – worldwide application possible
- participation of **various investors** - allows the **general public** easier, disintermediated access and participation
- **Automated handling** of financial flows and customer relations - **continuous flow back** of the revenues
- high level of **transparency** of all cash flows for investors
- Long term and **secure return** on equity capital.

EXAMPLE

Investment into a 2kWp PV plant + Heat Pump (COP = 3);
Effective area to heat = 150 m², 100 kWh_{th} / m²a (former heating system: Oil)



CONCLUSIONS

- **Investments into PV installations is a scalable and transferable business model.**
- **The additional installation of heat pumps**
  - Will reduce thermal energy costs, but increase electric energy cost
  - Combined with PV → higher self consumption and economic benefits.
  - Whole system needs to be analyzed for more precise costs estimate
  - shifting flexible loads would enable one to increase self consumption

- **The blockchain approach can have many advantages**
  - E.g. scalability, participation of various investors; automated handling of financial flows; high level of transparency and security
  - However, the regulatory environment and changing subsidies are causing an administrative burden when implementing viable business models

FUNDING

- The project SonnWende+ was supported with funds from the bmvit and implemented in line with the “City of tomorrow” program (4. Ausschreibung), project number 861621

SonnWende+

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TOMORROW TODAY

THANK YOU!

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lab10 sustainable blockchain solutions

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