Biogas-powered district heating uses local waste streams and contributes to local energy independence in BIOENERGY-villages

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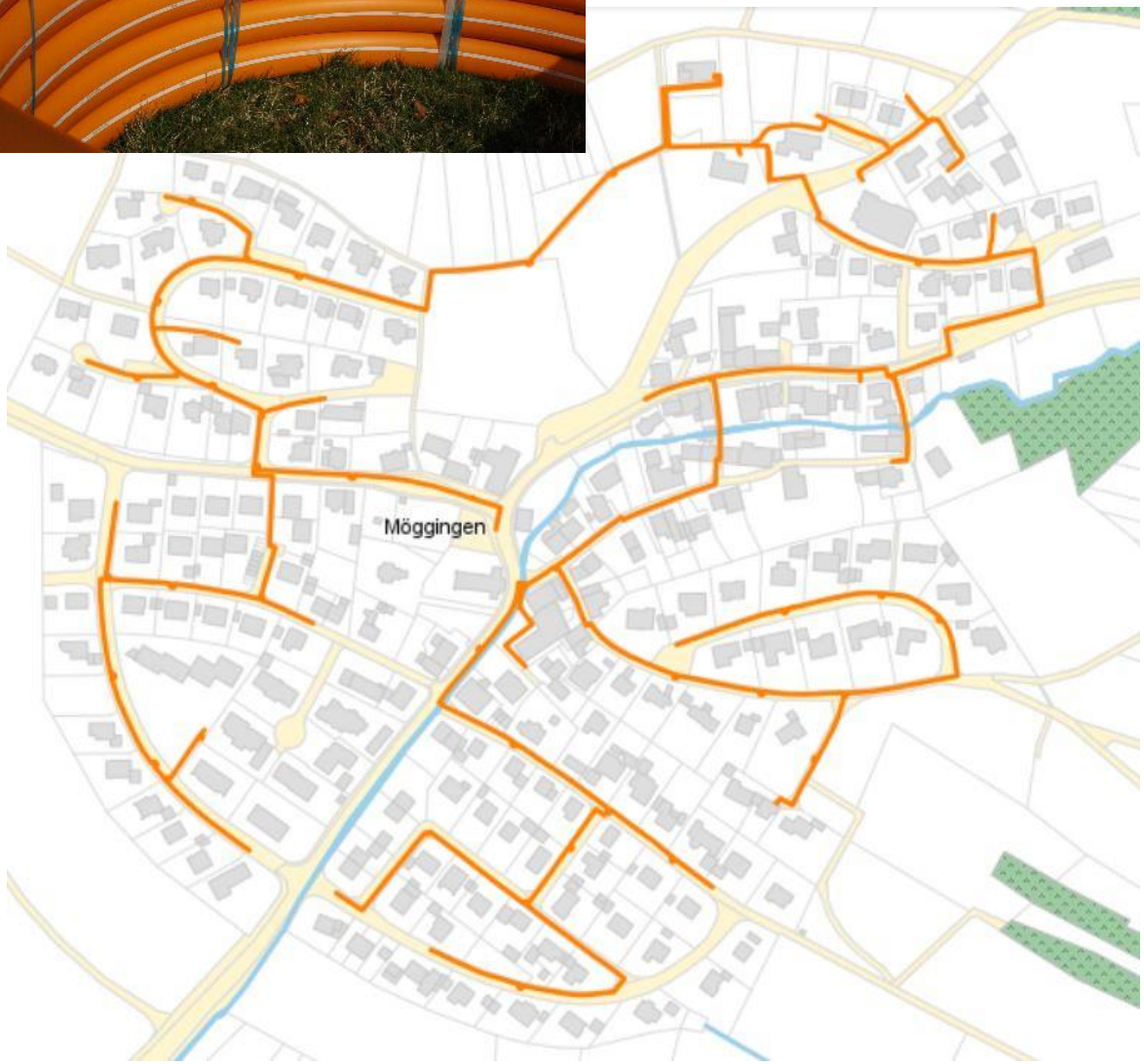
Bioenergy village – a flexible concept

- District heating network (the heart)
- Majority of houses are connected
- Waste heat from CHP (biogas) as base load
- Other RES to supplement (e.g. wood chips, solar heat…)
- Technology open infrastructure (Adaptation to future needs)

- High acceptance and direct participation are keys for success
    - In planning
    - In management
    - In revenue

Currently more than 170 bioenergy villages exist in Baden-Württemberg!

District heating in Möggingen



Heating sources

1. Biogas plant
2. Woodchip burner

Motivation and main actors

Heating in rural areas relies strongly on fossil fuels

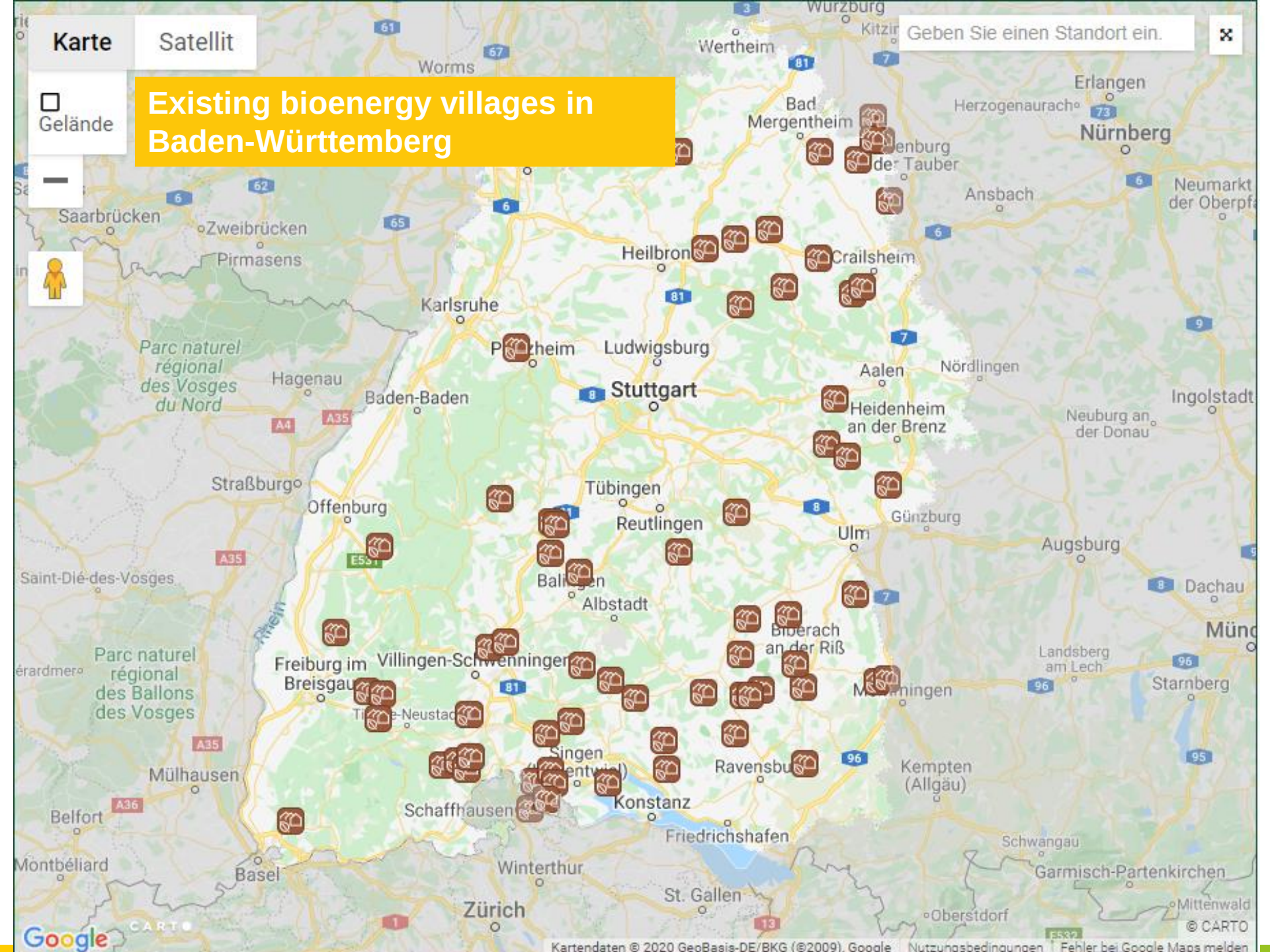
→ Strong dependence (import)

→ Loss of added value

→ Failure to meet climate targets

Main actors:

- community (consumer, operator, biomass supplier)
- local farmers (biogas, biomass)
- local energy suppliers (operators, financial management, planning, investor)
- Local forestry (biomass)


Karte
Satellit
Gelände
Geben Sie einen Standort ein.
Existing bioenergy villages in Baden-Württemberg
Würzburg
Wertheim
Worms
Bad Mergentheim
Erlangen
Herzogenaurach
Nürnberg
Ansbach
Neumarkt der Oberpf
Saarbrücken
Zweibrücken
Pirmasens
Heilbronn
Crailsheim
Karlsruhe
Ludwigsburg
Stuttgart
Aalen
Nördlingen
Ingolstadt
Parc naturel régional des Vosges du Nord
Hagenau
Baden-Baden
Heidenheim an der Brenz
Neuburg an der Donau
Straßburg
Offenburg
Tübingen
Reutlingen
Ulm
Günzburg
Augsburg
Saint-Dié-des-Vosges
Albstadt
Dachau
Biberach an der Riß
Parc naturel régional des Ballons des Vosges
Freiburg im Breisgau
Villingen-Schwenningen
Landsberg am Lech
Starnberg
Mülhausen
Singen
Ravensburg
Kempten (Allgäu)
Belfort
Konstanz
Schaffhausen
Friedrichshafen
Montbéliard
Basel
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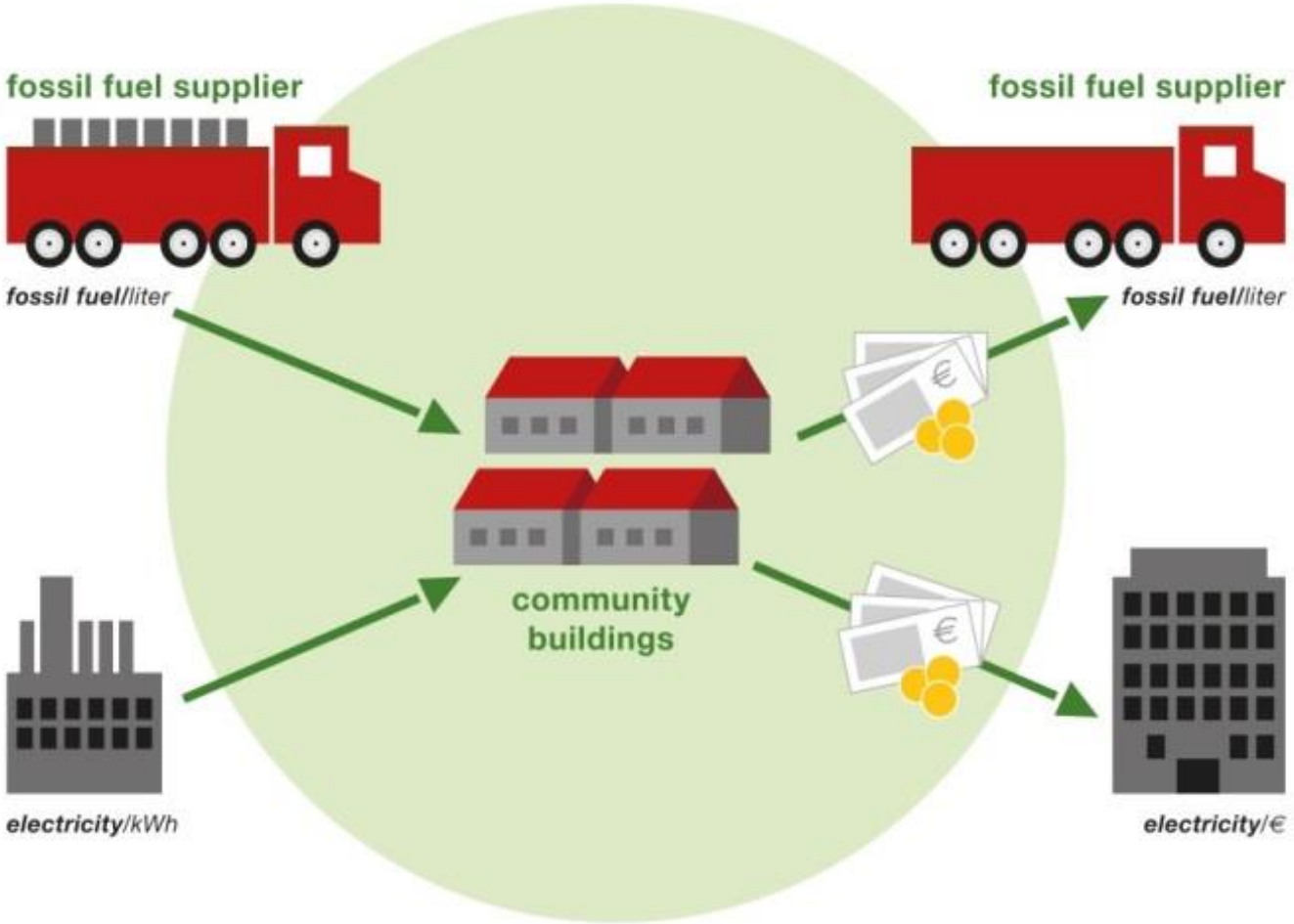
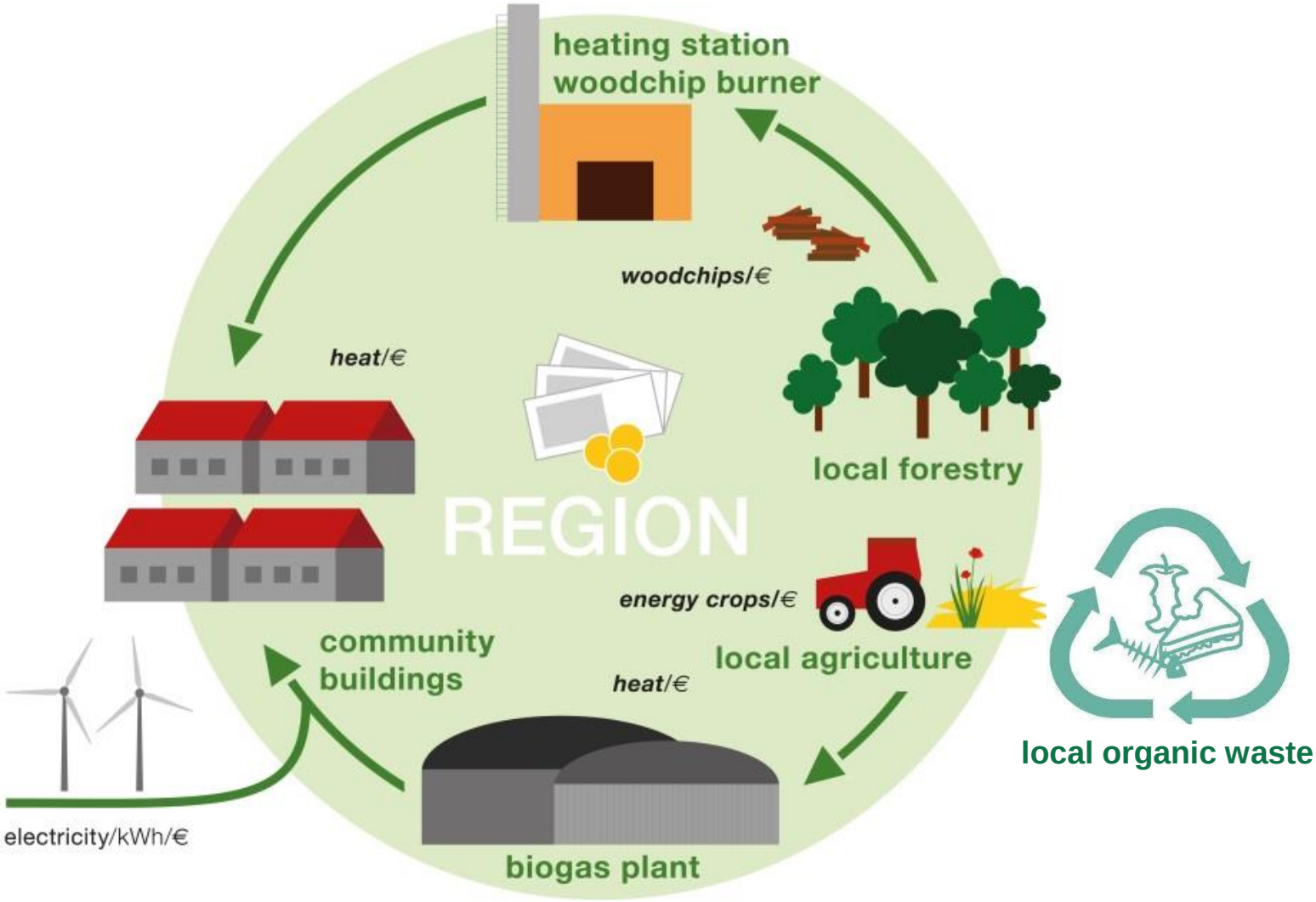
Nutzungsbedingungen
Fehler bei Google Maps melden

Loss of added value



Loss of added value when using fossil fuels

Added value by bioenergy villages



Added value by bioenergy villages and district heating

Business case and finance

Business case:

- 1-3 mio € for heating network
- ~1 mio € for biogas plant
- Quite a bit of manpower to convince the community to connect to the district heating
- At least 60% of all households have to connect in order to make it economically feasible.

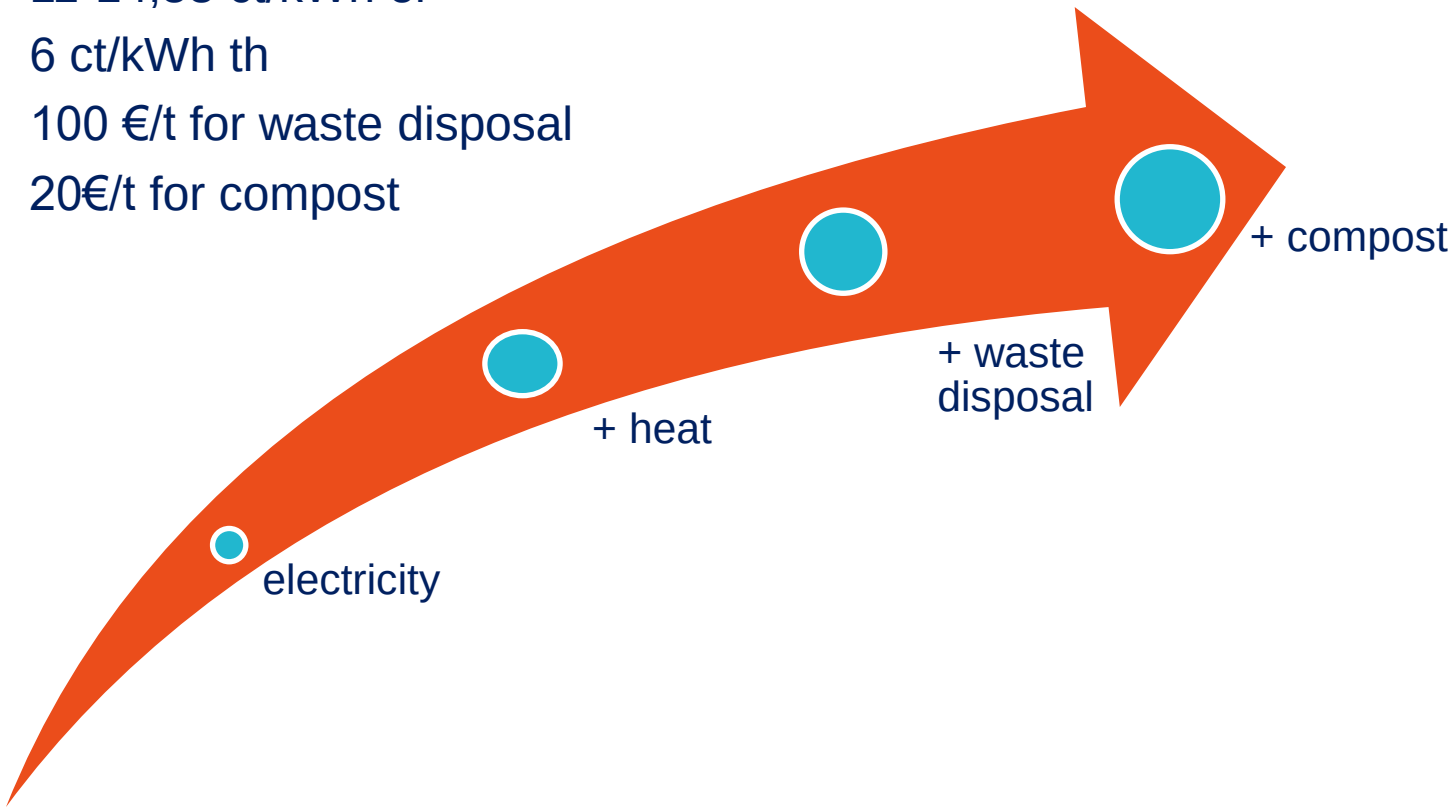
Financing:

- Community
- Local energy supplier
- Bank loans (attractive conditions from state bank kfw)
- Feed-in tariff for electricity
- Remuneration for heat energy from customers

A possible future business model?

- **Current LCOE ~14 ct/kWh**

- **Farming biogas plant using organic waste (Germany)**
  - 11-14,58 ct/kWh el
  - 6 ct/kWh th
  - 100 €/t for waste disposal
  - 20€/t for compost



Multiple benefits for the local community

- Green local energy
  - Renewable heat
  - Renewable power
  - Renewable gas

- Regional development
  - Regional added value and employment
  - Contribution to municipal and private waste issues (greencuts, organic waste, manure etc)
  - Independence from import of (fossil) energy
  - Organic fertilizer

- Environmental benefits
  - Community contribution to climate goals
  - Improved air quality (CH_4, N_2O, NH_3, NO_x)

Challenges in the process

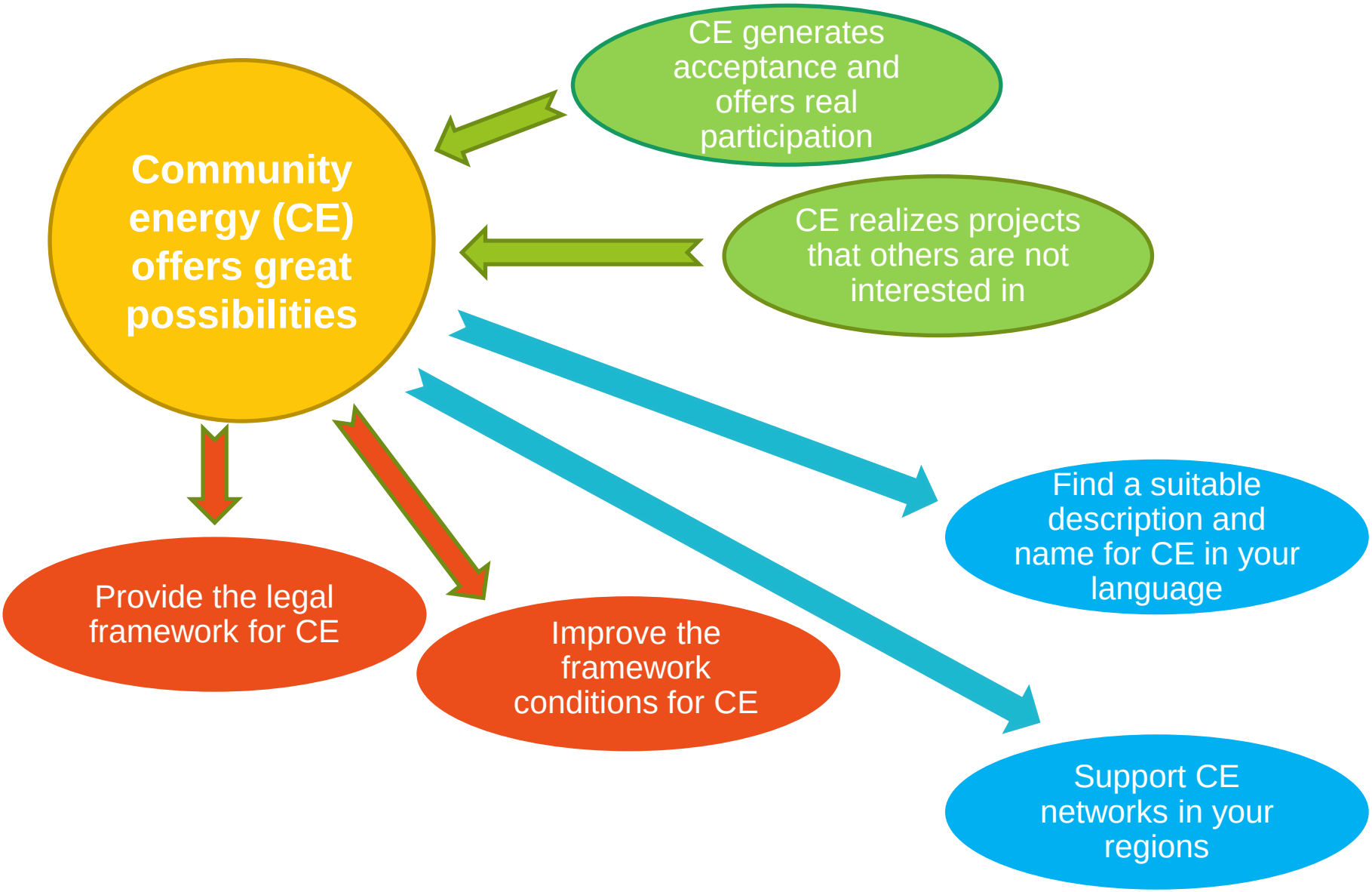
Two options with different challenges:

1. Using an existing plant
   - Permission: only after EEG
   - Distance: either heat pipe or micro gaspipe
   - Acceptance: getting people involved
   - ~ 2 years from the idea to the first heating period

2. Building a new plant
   - Investment: higher investment
   - Operating the plant: operator and knowhow needed
   - Acceptance: smell, traffic, participation
   - 2-3 years from the idea to the first heating period

→ District heating is technology open
→ Infrastructure can be also used for cooling

Recommendations for local policy makers



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Thank you for your interest!

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