

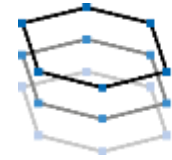
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# The potential of landscape development through direct current

Sandra Sieber, Flexible Electrical Networks (FEN) Research Campus,  
RWTH Aachen University, Department of Landscape Architecture, Aachen



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## Facts

**24**

Industrial Partners  
(14 MV Consortium, 10 LV Consortium)

**15**

Institutes  
of RWTH Aachen University

**8**

Publicly Funded Projects

**16**

Further Projects

Source: FEN 2018

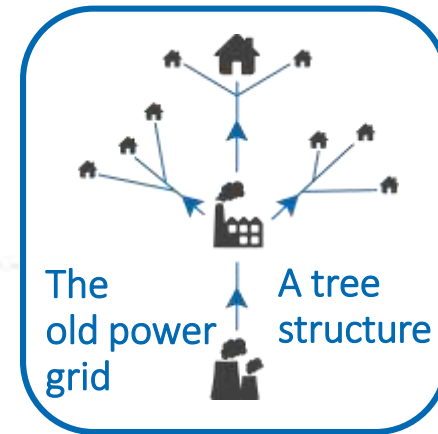
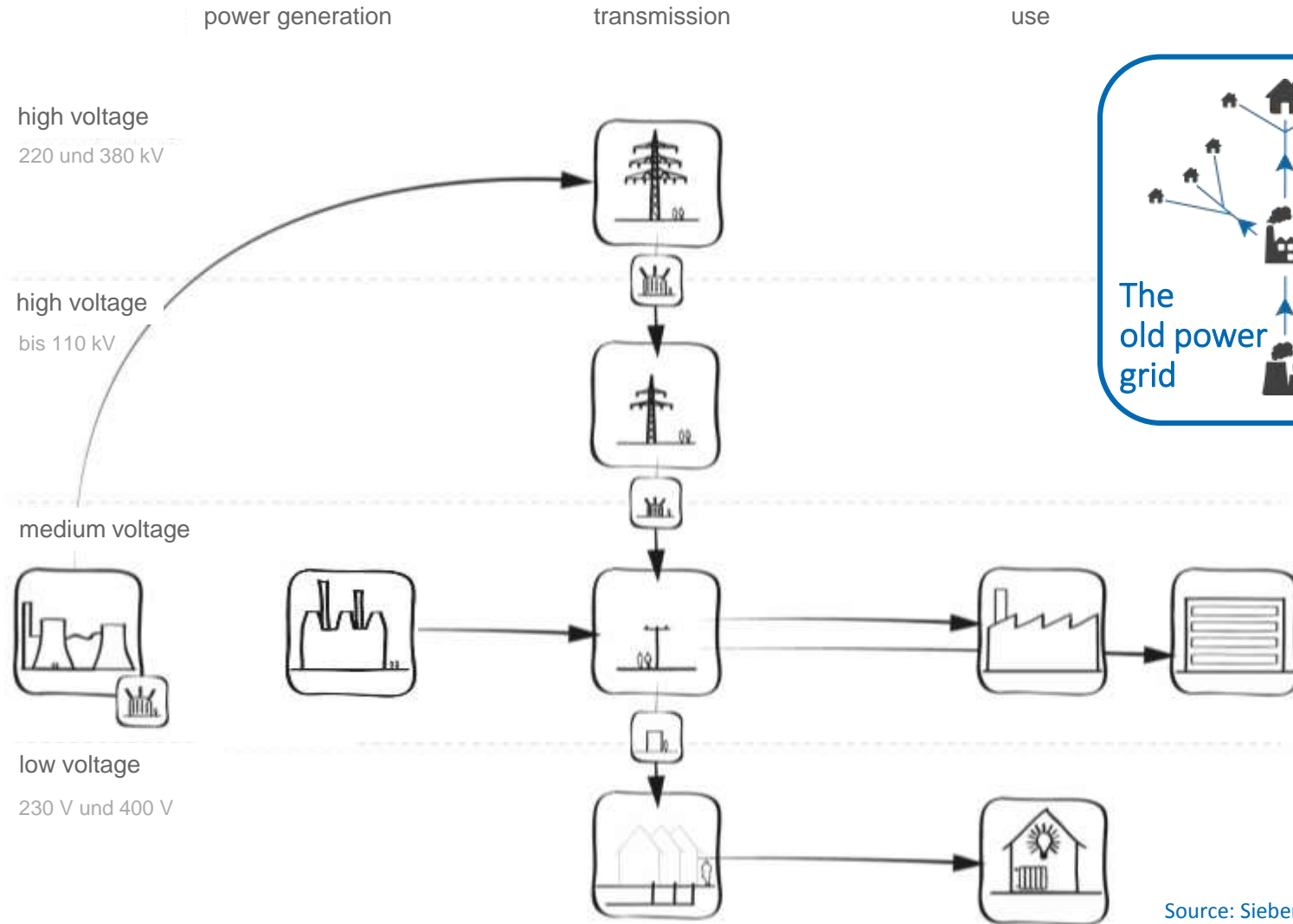
# The potential of landscape development through direct current?

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## The approach

- ▶ Determine the meaning of DC within the power supply
- ▶ Determine the spatial objectives of the energy transition
- ▶ Outlining the impact of DC on urban areas (case study and energetic analysis for a district of Aachen)
- ▶ Deducing the meaning for the landscape / landscape development

# The meaning of DC within power supply | The old power grid



Source: Sieber, 2016 and FEN

# The meaning of DC within power supply | The power supply today

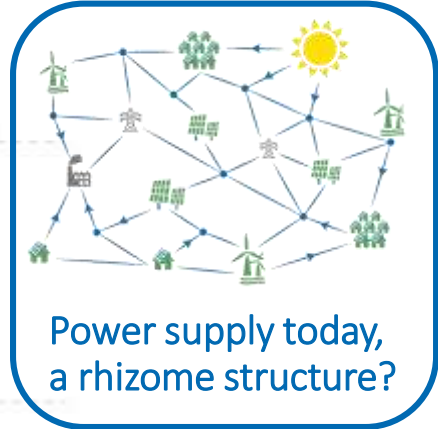
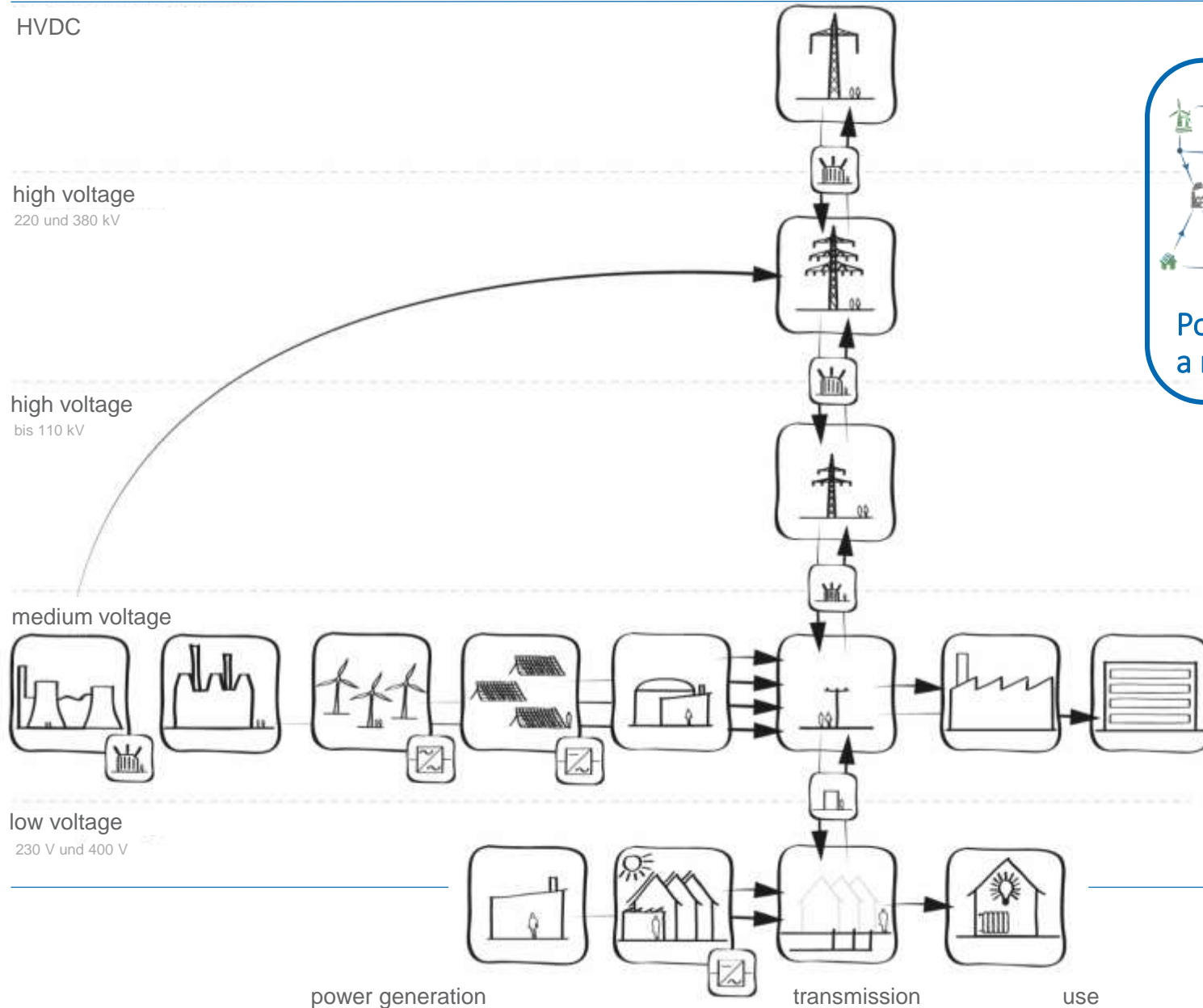
HVDC

high voltage  
220 und 380 kV

high voltage  
bis 110 kV

medium voltage

low voltage  
230 V und 400 V



Power supply today,  
a rhizome structure?

Source: Sieber, 2016 and FEN

*Increasing  
importance of  
the medium-  
voltage level  
(MV)*

*Increasing  
importance of  
direct current  
grids  
(DC grids)*

# The meaning of DC within power supply | The power supply today

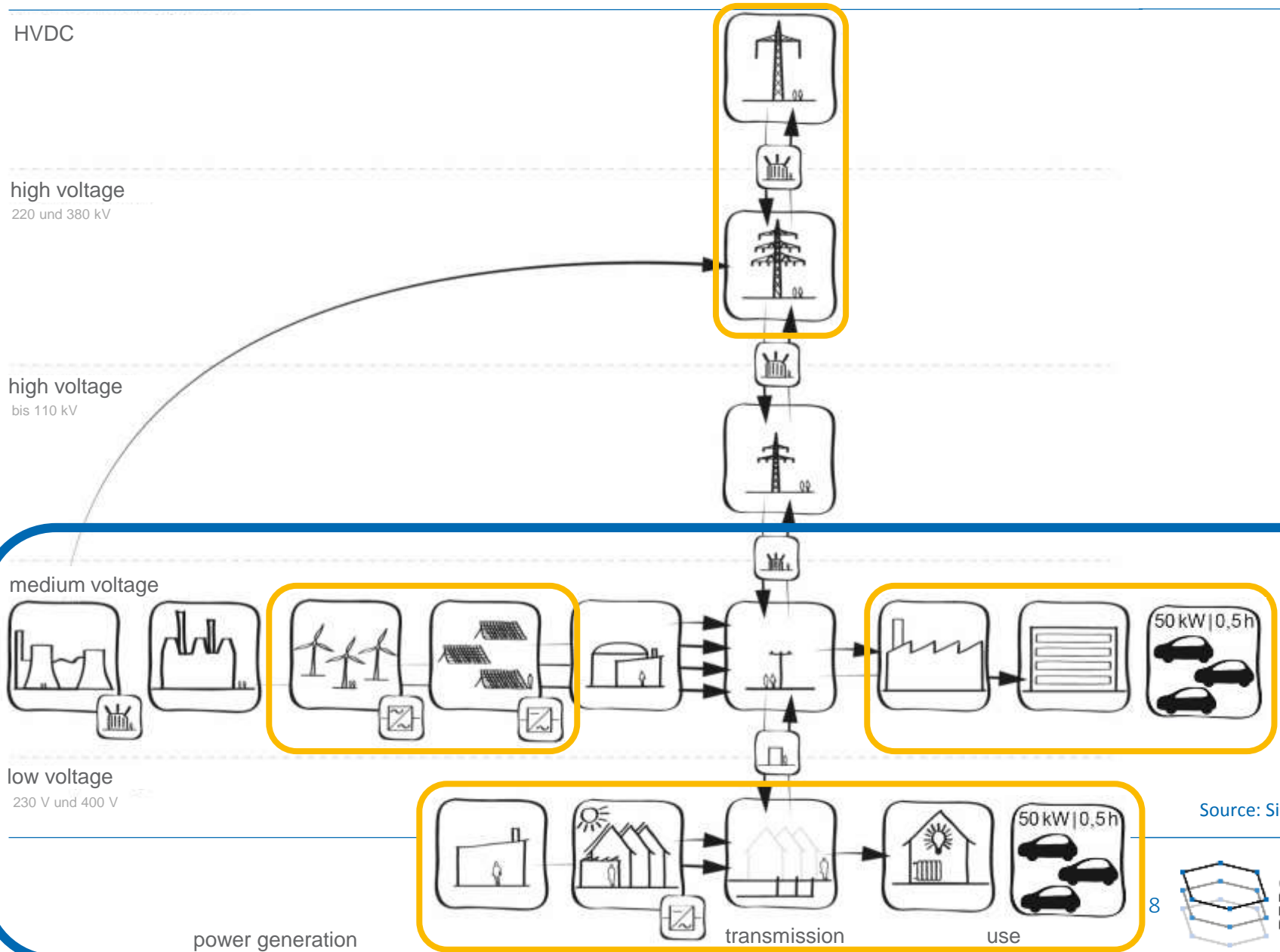
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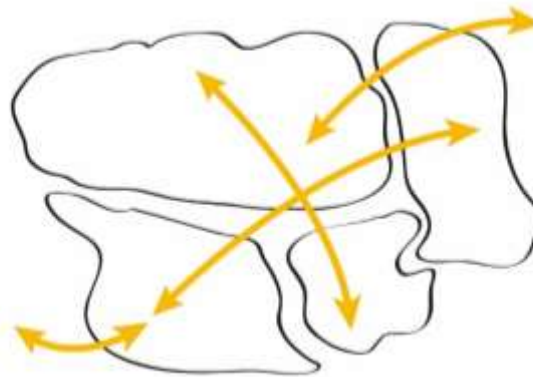
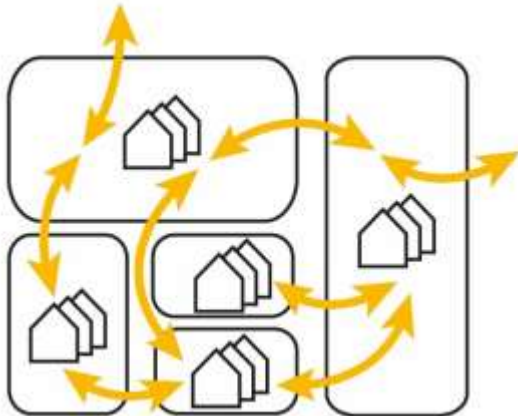
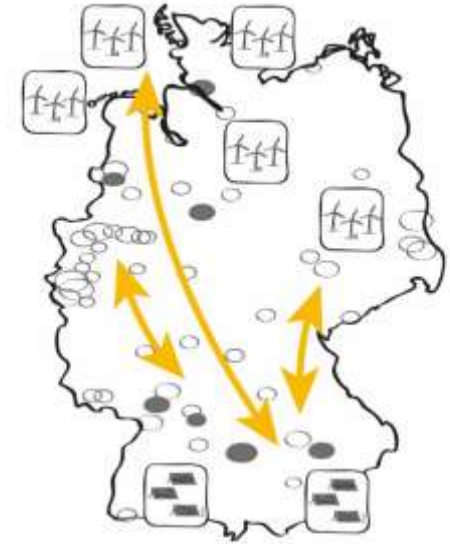
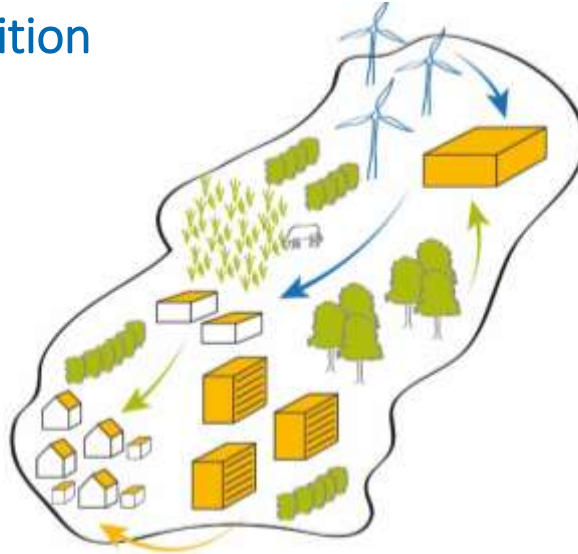
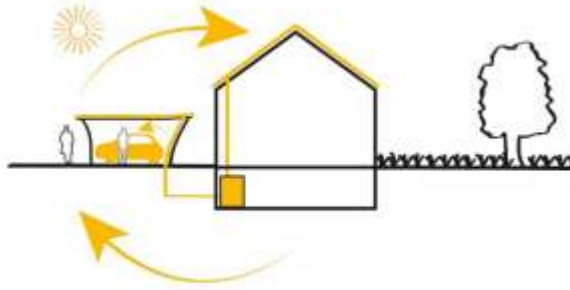


Source: Sieber, 2016



# Determine the spatial objectives of the energy transition

Where does the energy transition actually take place?



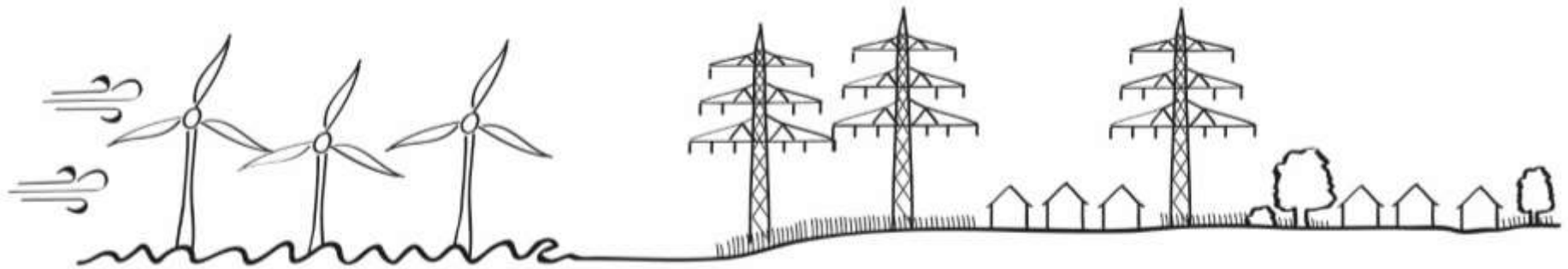
Level "Quartier"

Level "Region"

Level "Trans-National"

# Determine the spatial objectives of the energy transition

## Current objective of the energy transition



# The potential of landscape development through direct current?

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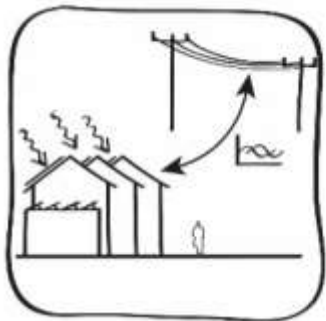
## Summary of the results

- ▶ Of the case study and of the energetic analysis
  - ▶ Outlining the impact of DC on urban areas
  - ▶ Deducing the meaning for the landscape / landscape development

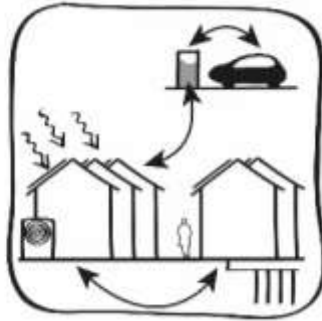
# Possible benefits of DC?

## Assumptions (Summer 2018)

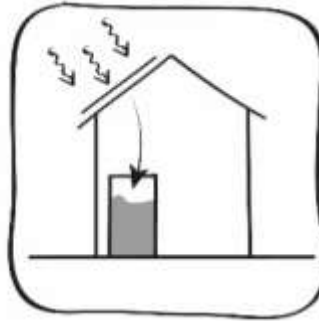
Please note, the assumptions are preliminary!  
During the project, these assumptions can be confirmed or even revised.



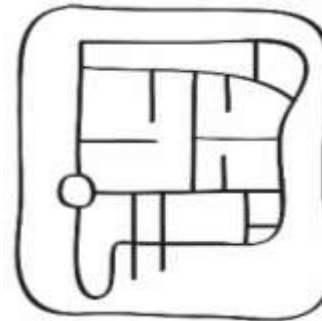
Power supply and control



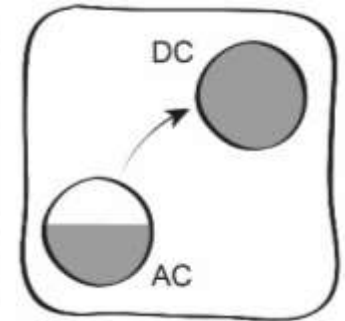
Energetic district development



Storage systems



Flexible network topology

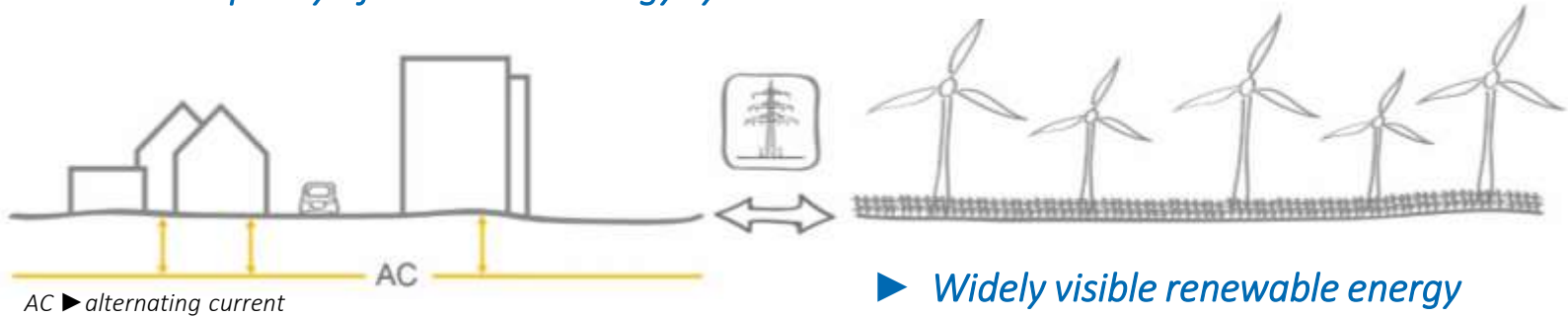


Higher network capacity

# The potential of landscape development through direct current?

Today

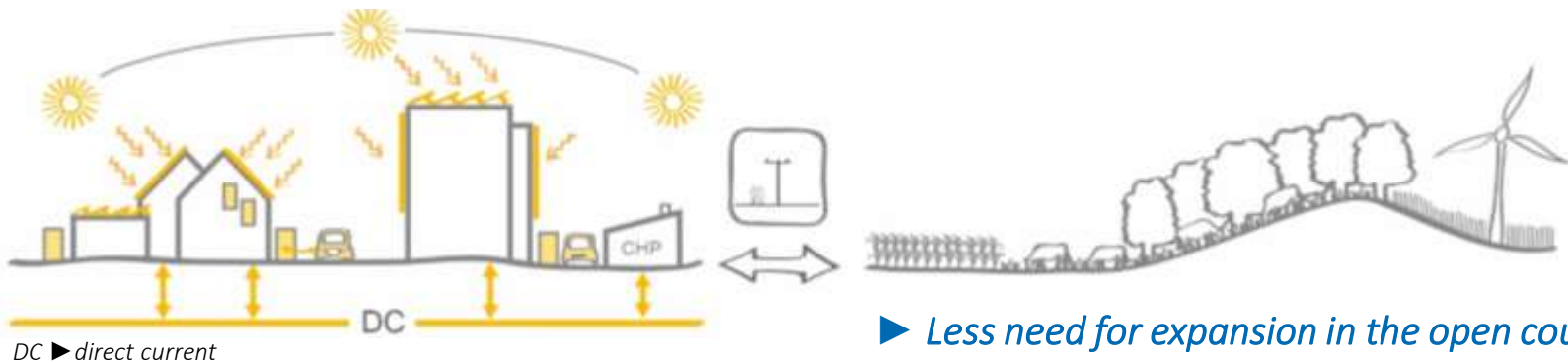
- ▶ The installed capacity of renewable energy systems in town is low



- ▶ Widely visible renewable energy systems in the open countryside

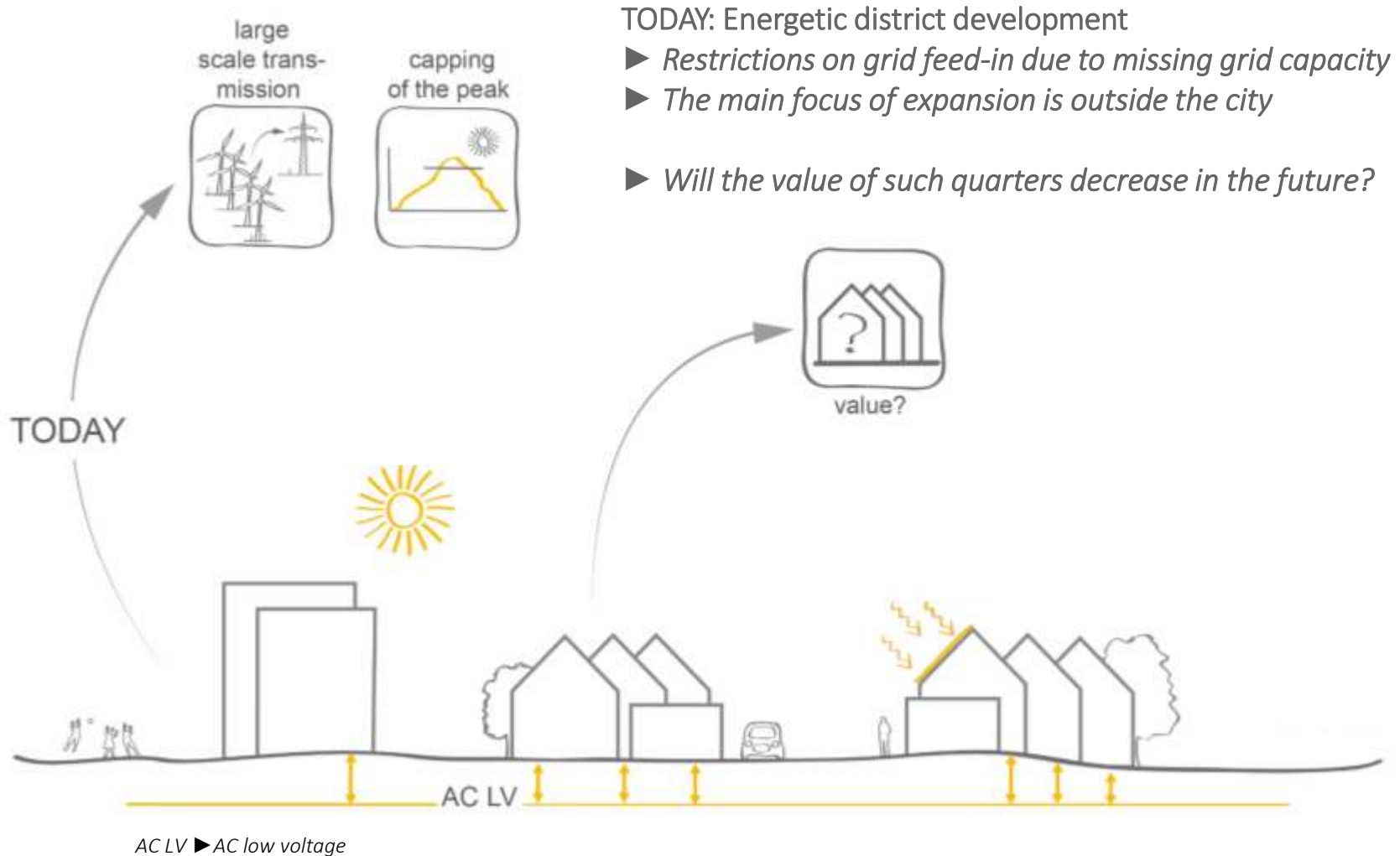
Innovation through DC networks?

- ▶ More development potential for renewable energy systems in town?



- ▶ Less need for expansion in the open countryside?

# The potential of landscape development through direct current?

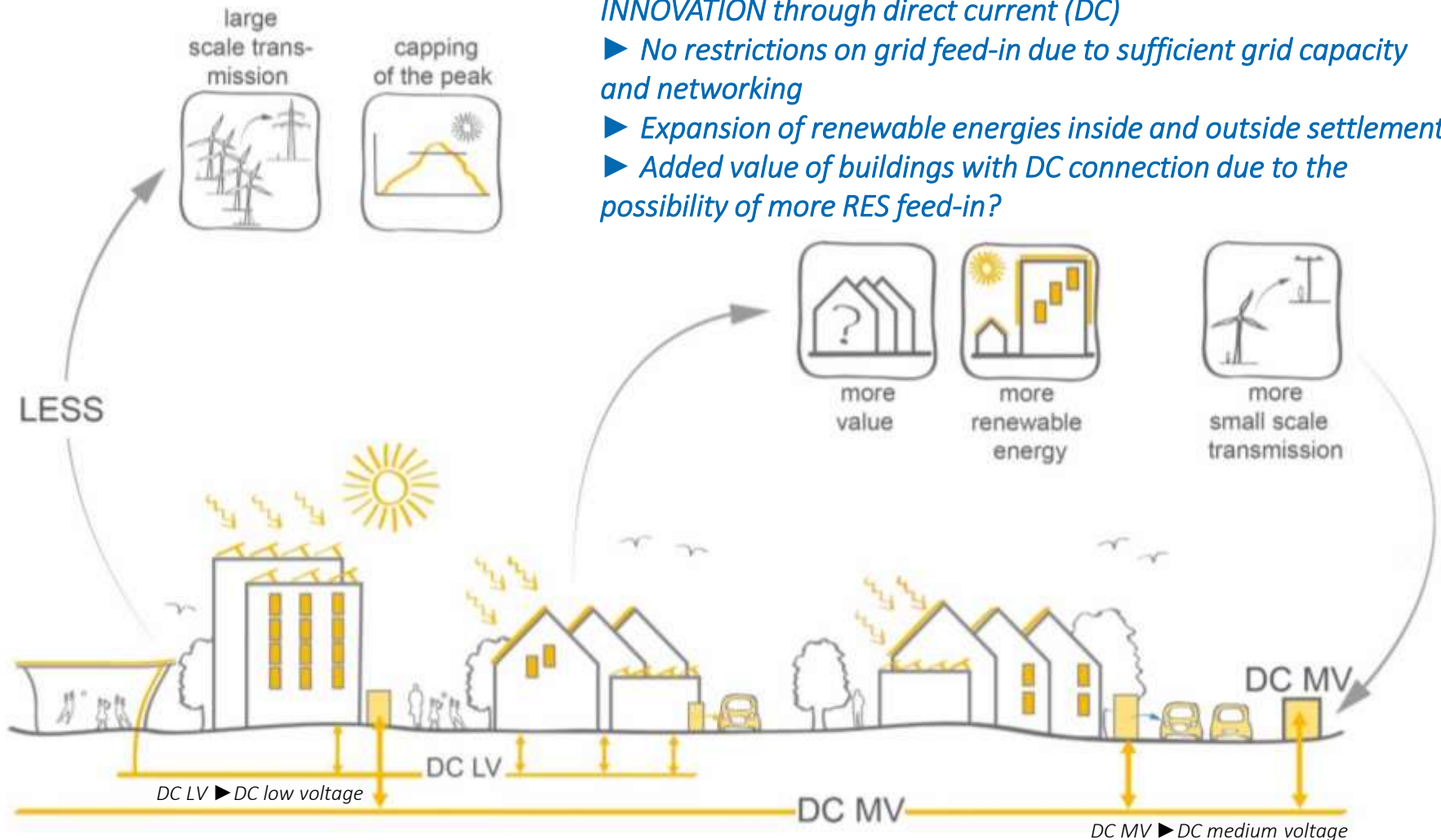


Source: Sieber, 2018

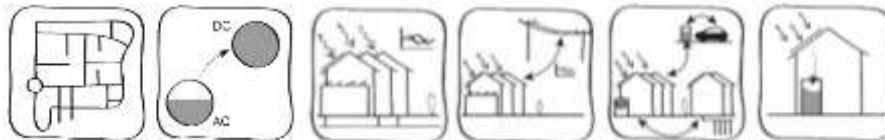
# The potential of landscape development through direct current?

## INNOVATION through direct current (DC)

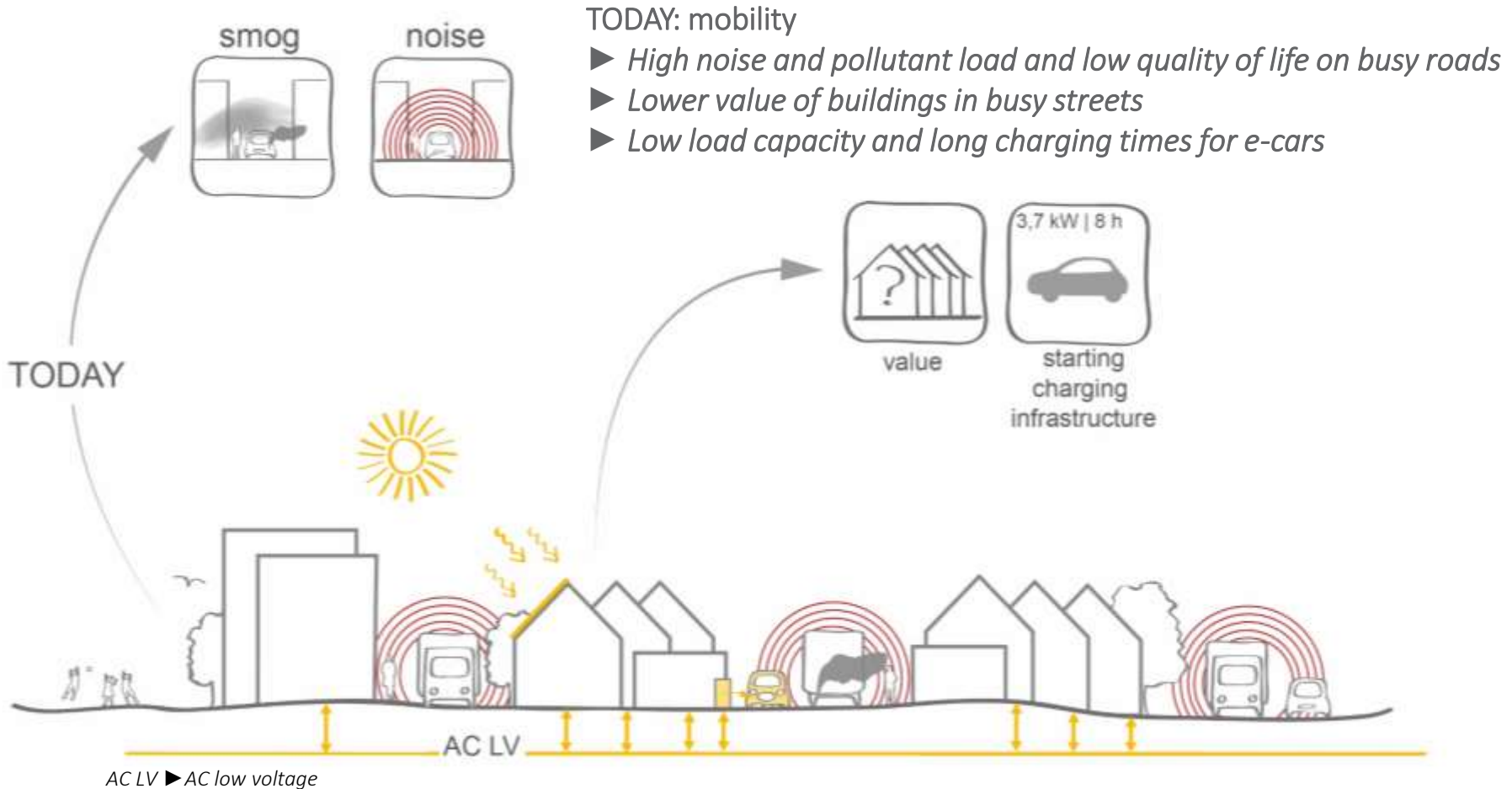
- ▶ No restrictions on grid feed-in due to sufficient grid capacity and networking
- ▶ Expansion of renewable energies inside and outside settlements
- ▶ Added value of buildings with DC connection due to the possibility of more RES feed-in?



Source: Sieber, 2018



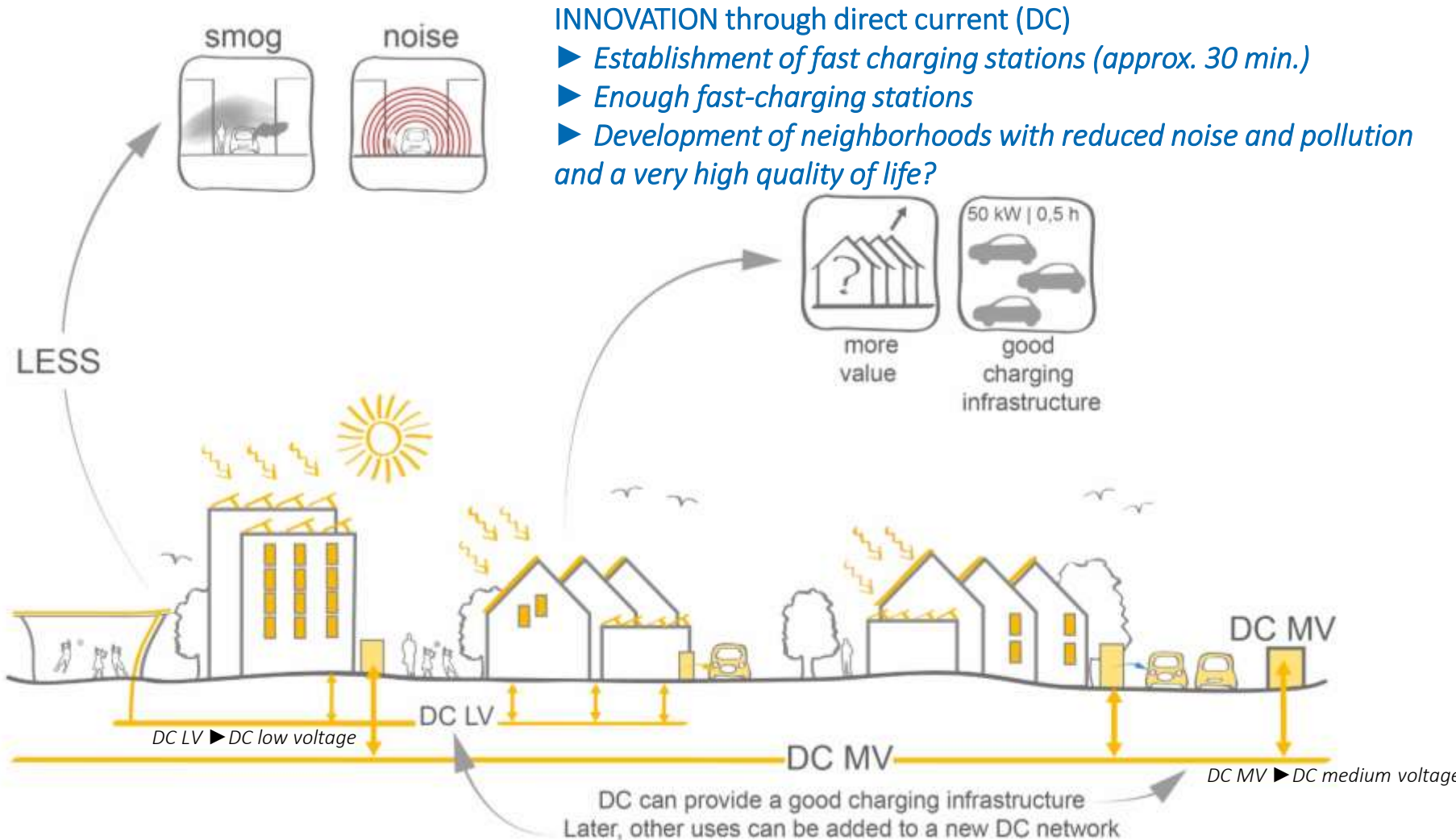
# The potential of landscape development through direct current?



Source: Sieber, 2018



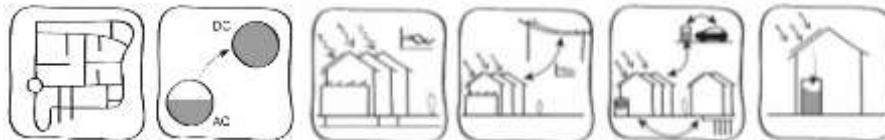
# The potential of landscape development through direct current?



INNOVATION through direct current (DC)

- Establishment of fast charging stations (approx. 30 min.)
- Enough fast-charging stations
- Development of neighborhoods with reduced noise and pollution and a very high quality of life?

Source: Sieber, 2018



# Thank you for your attention.

## Contact:

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