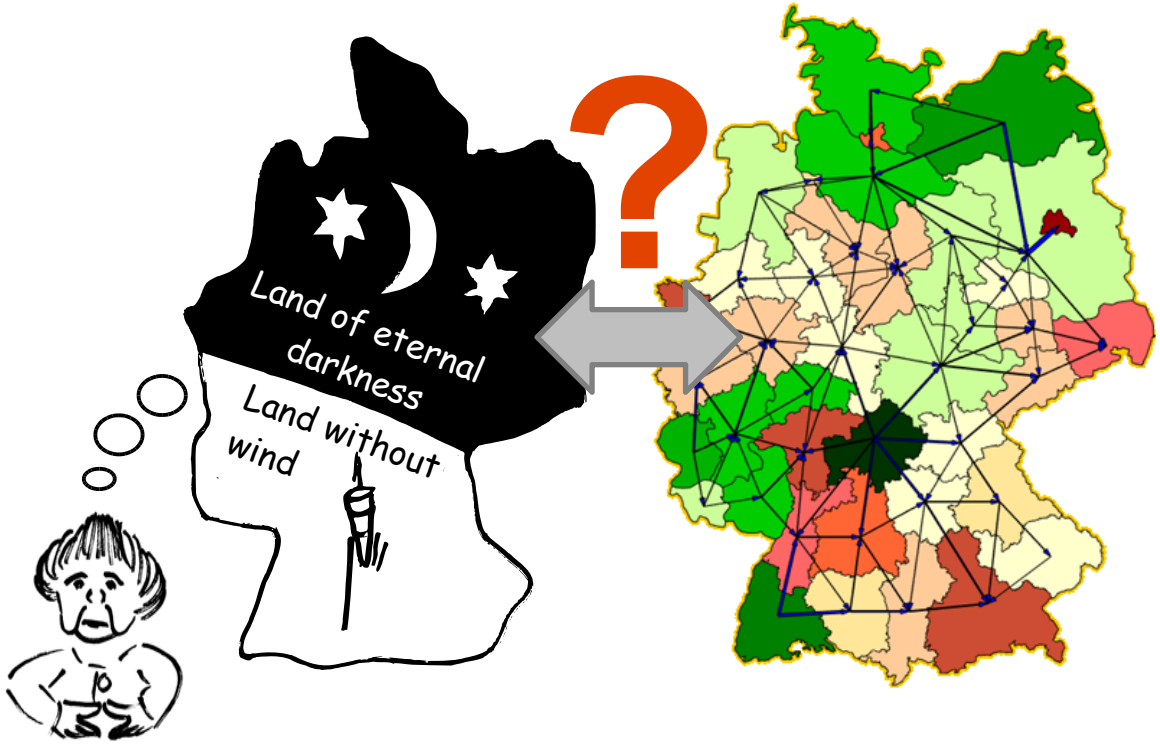
Options for an Autarkic Operation of a Communal Power Grid Using a Battery and Renewable Energies

Eberhard Waffenschmidt

IRES, Düsseldorf, 14. Mar. 2018

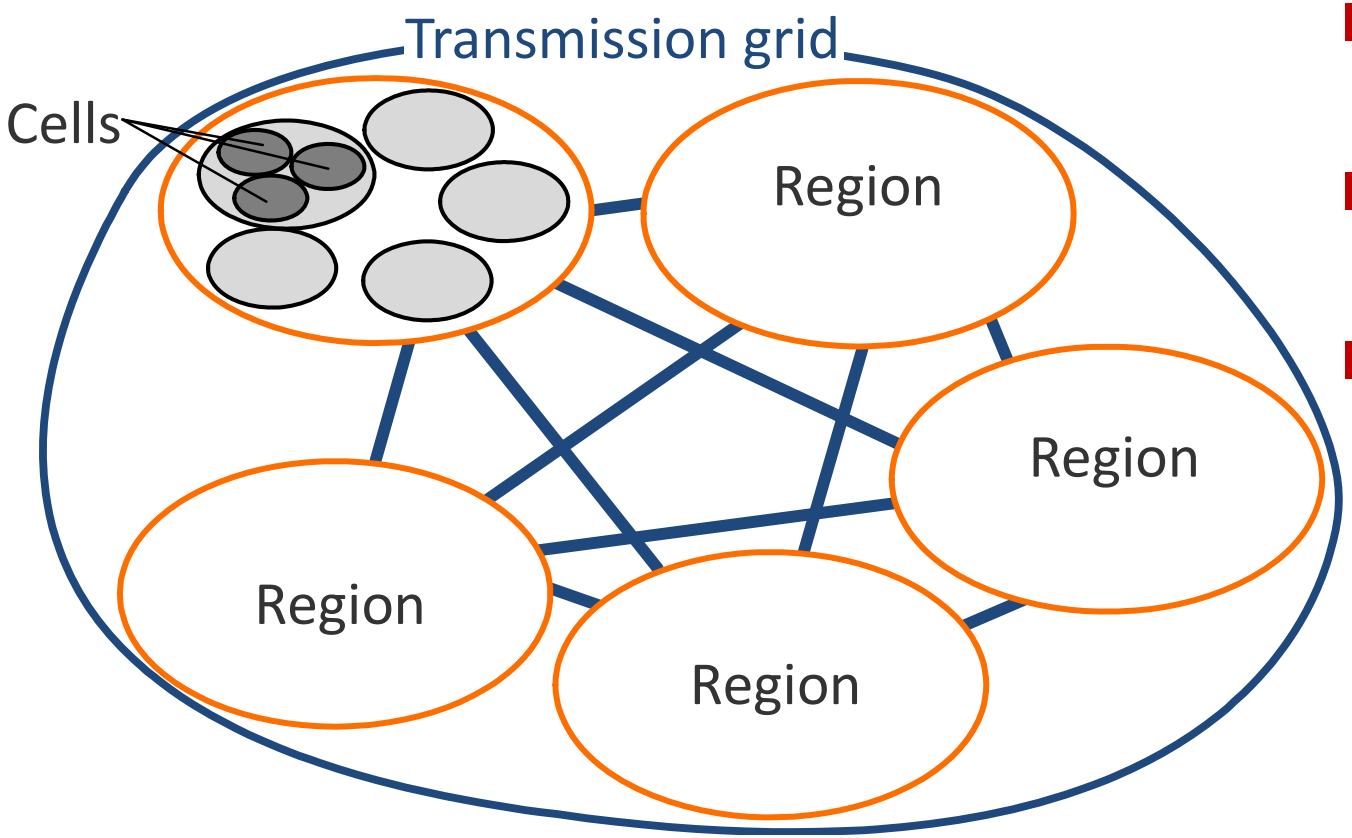
Future grid structure



Cellular power grid:

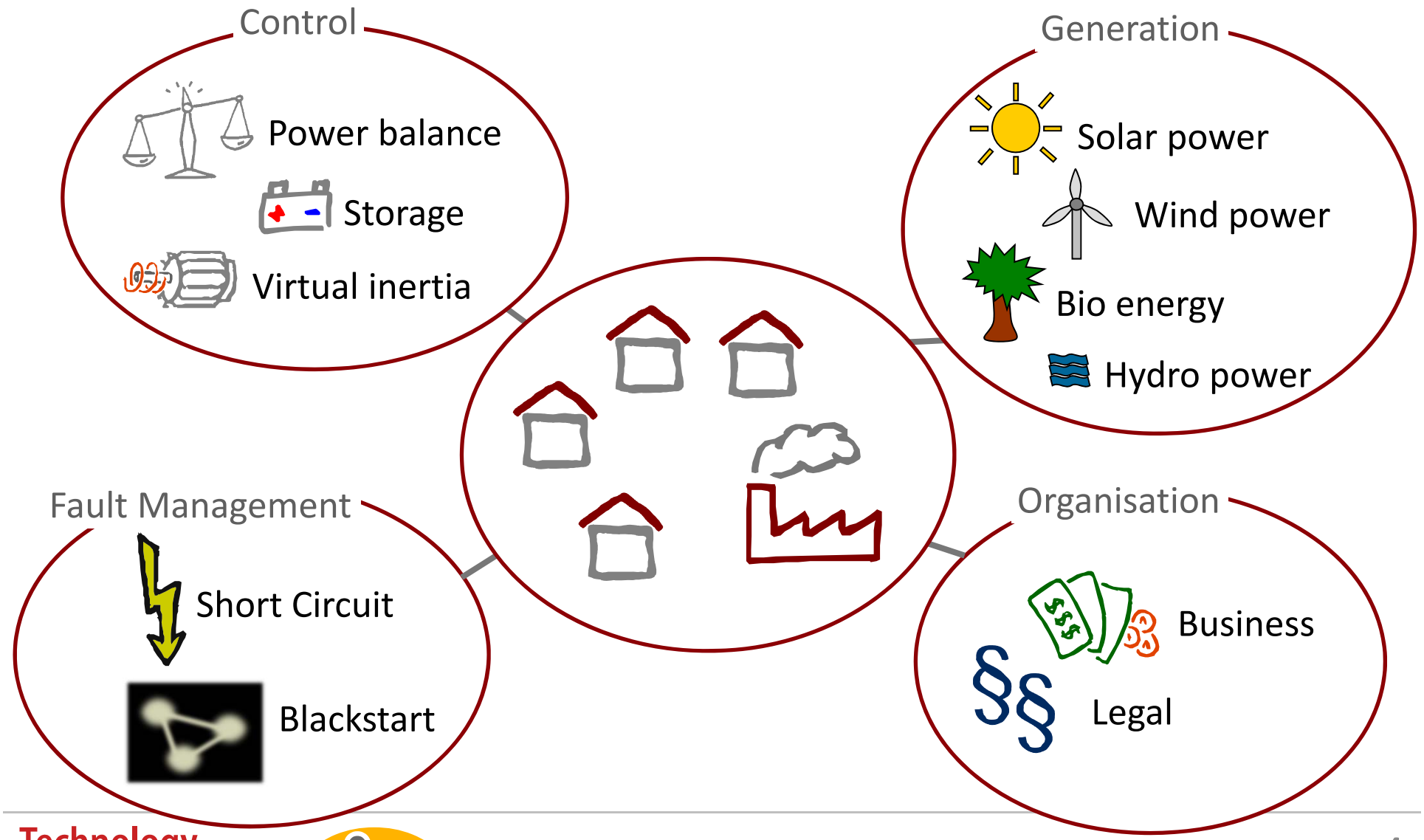
- Regionalized grid structure
- Decentralized power generation

Cellular grid

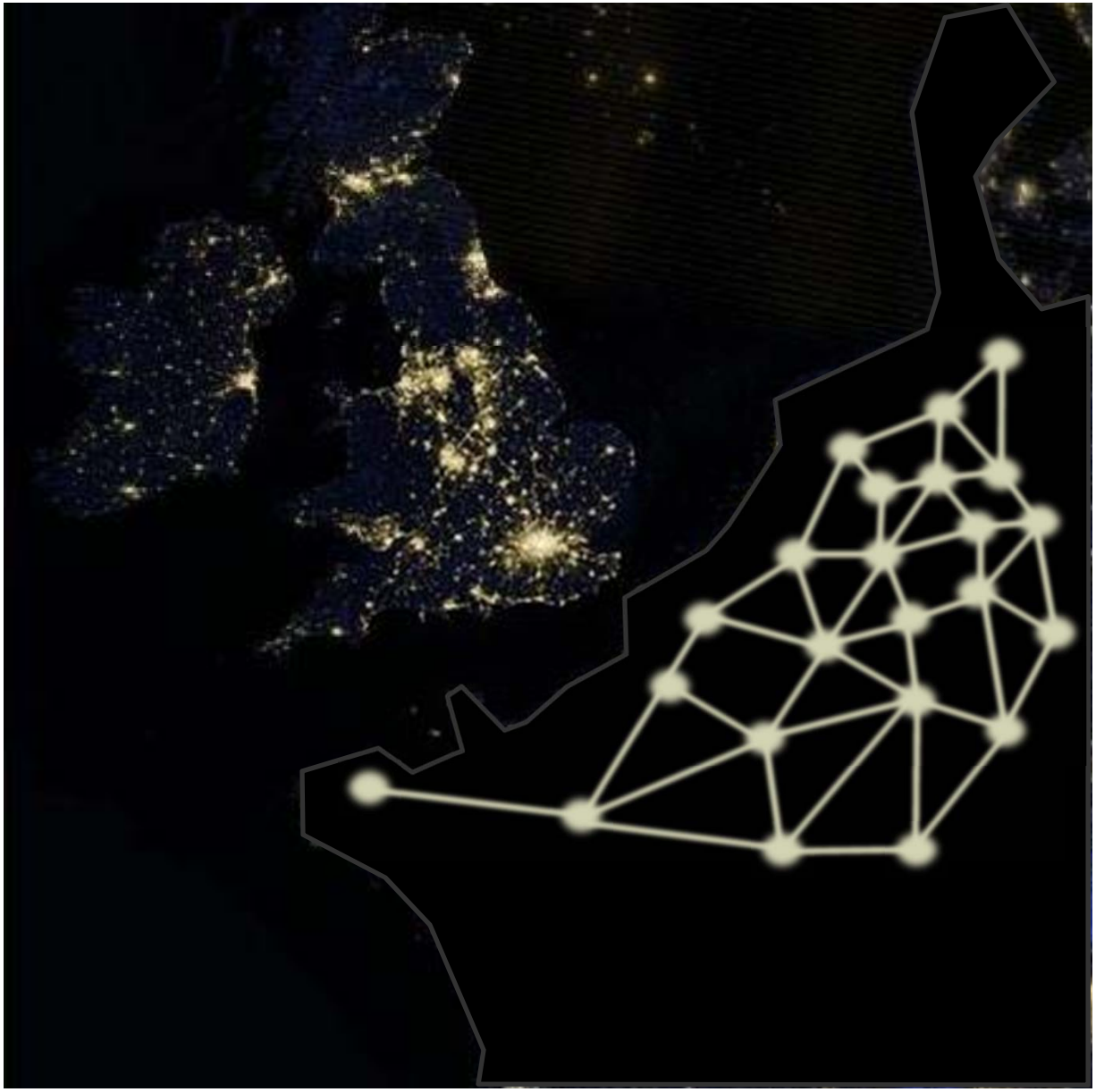


- Cells can be autarkic
- Bottom-up-approach
- Swarm control

Autarkic Cell



Blackout



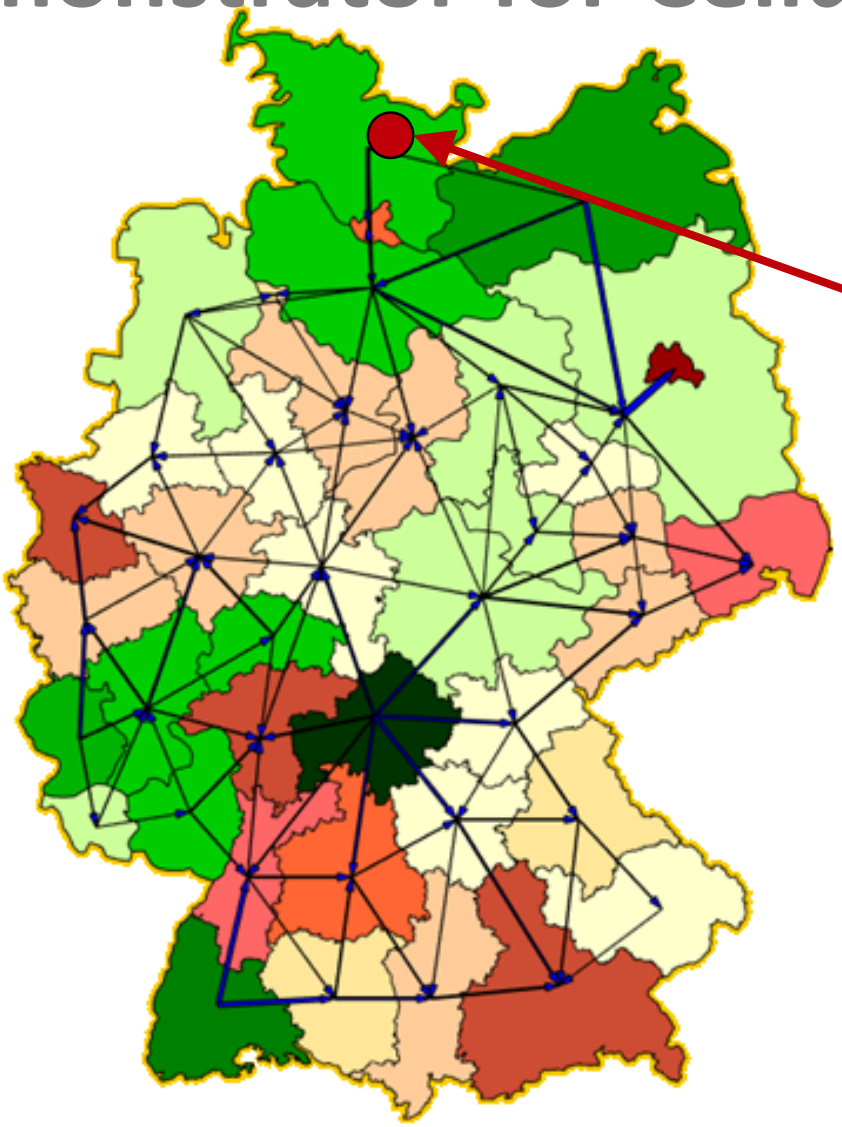
Whole Europa is hit by a Blackout.

Whole Europa?
Nope!
One smart village is able to fight the darkness...

And there will be more!

Foto: www.tagesschau.de

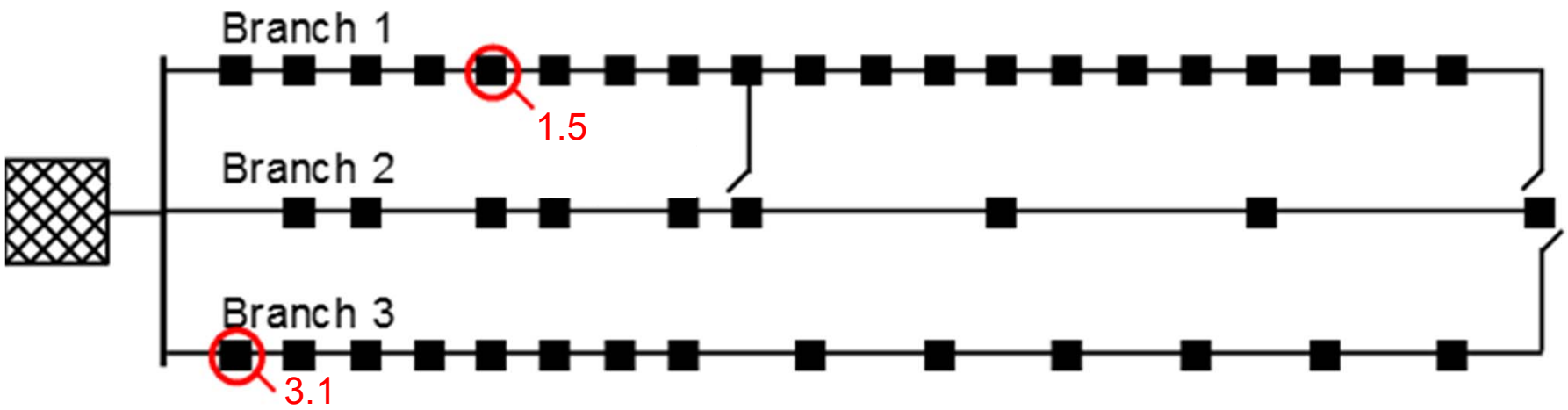
Demonstrator for Cellular Grid



Versorgungsbetriebe Bordesholm GmbH

Bordesholm

Technical Data



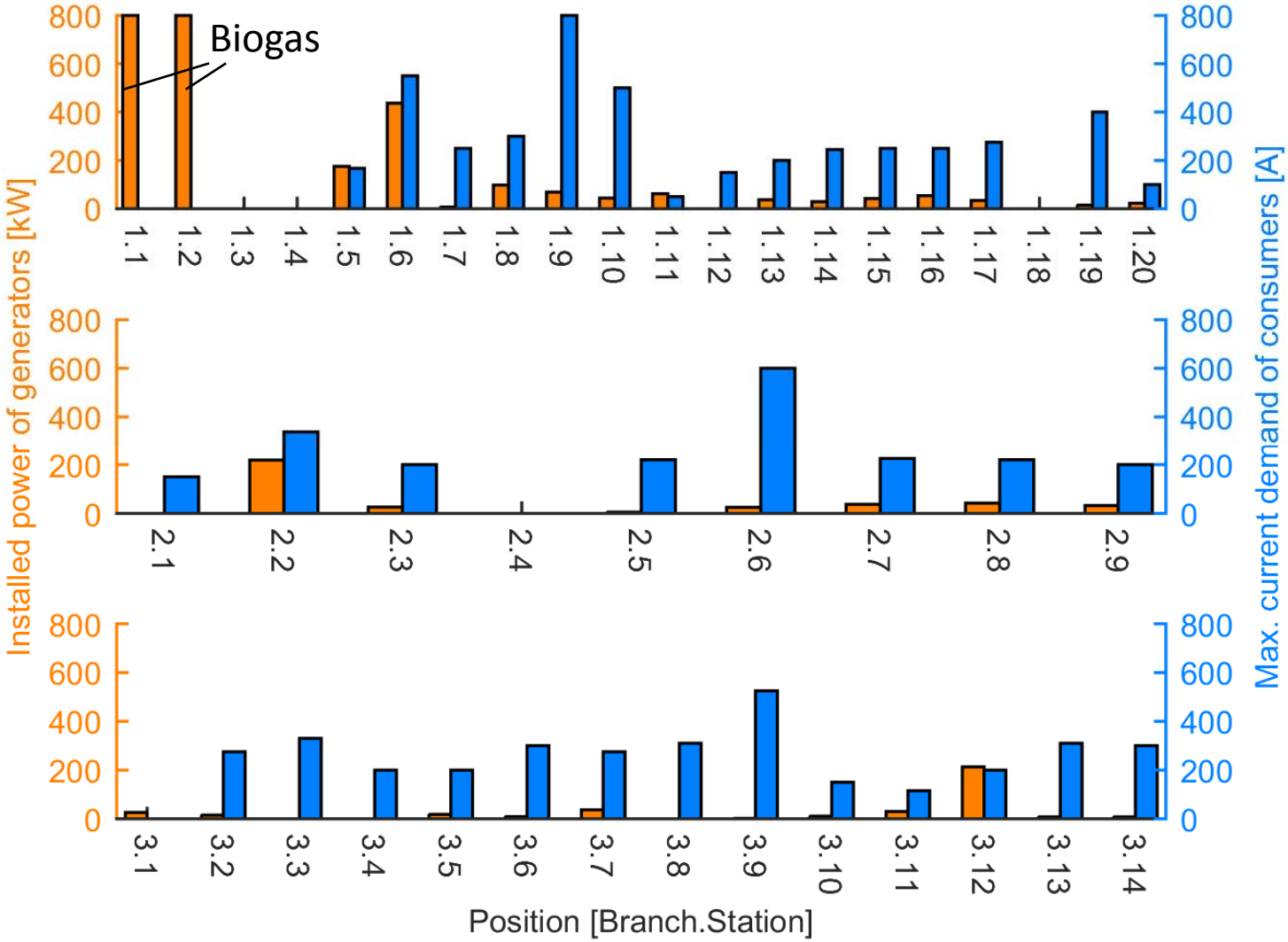
Bordesholm

- 7500 Inhabitants
- PV: 1.89 MWpk
- Biogas: 2 x 0.8 MW
- No wind power
- Residual load: max. 3 MW

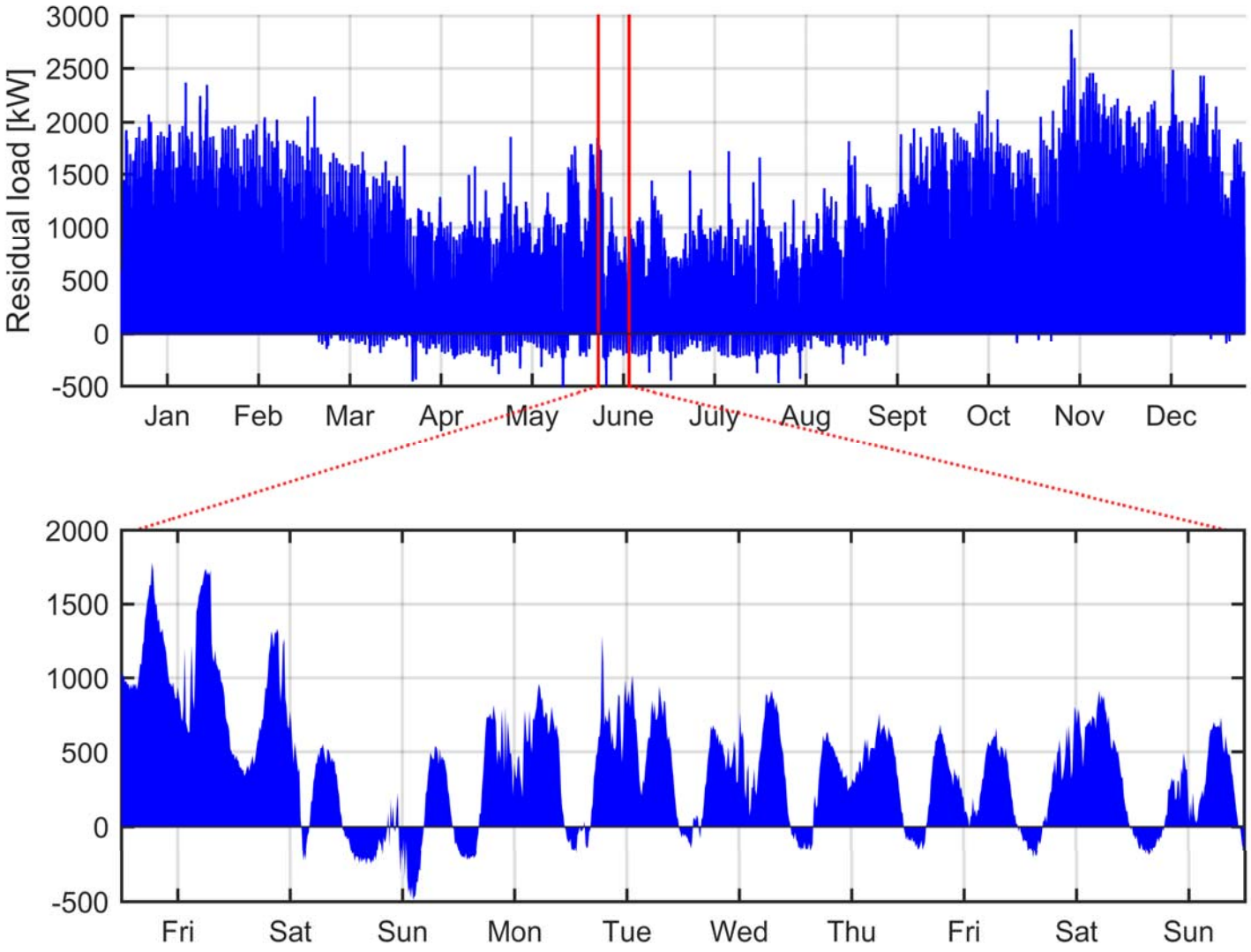
Battery

- Energy: 12 MWh
- Power: 8 MW
- Type: Li-Ion
- Standard operation: Primary Reserve Power

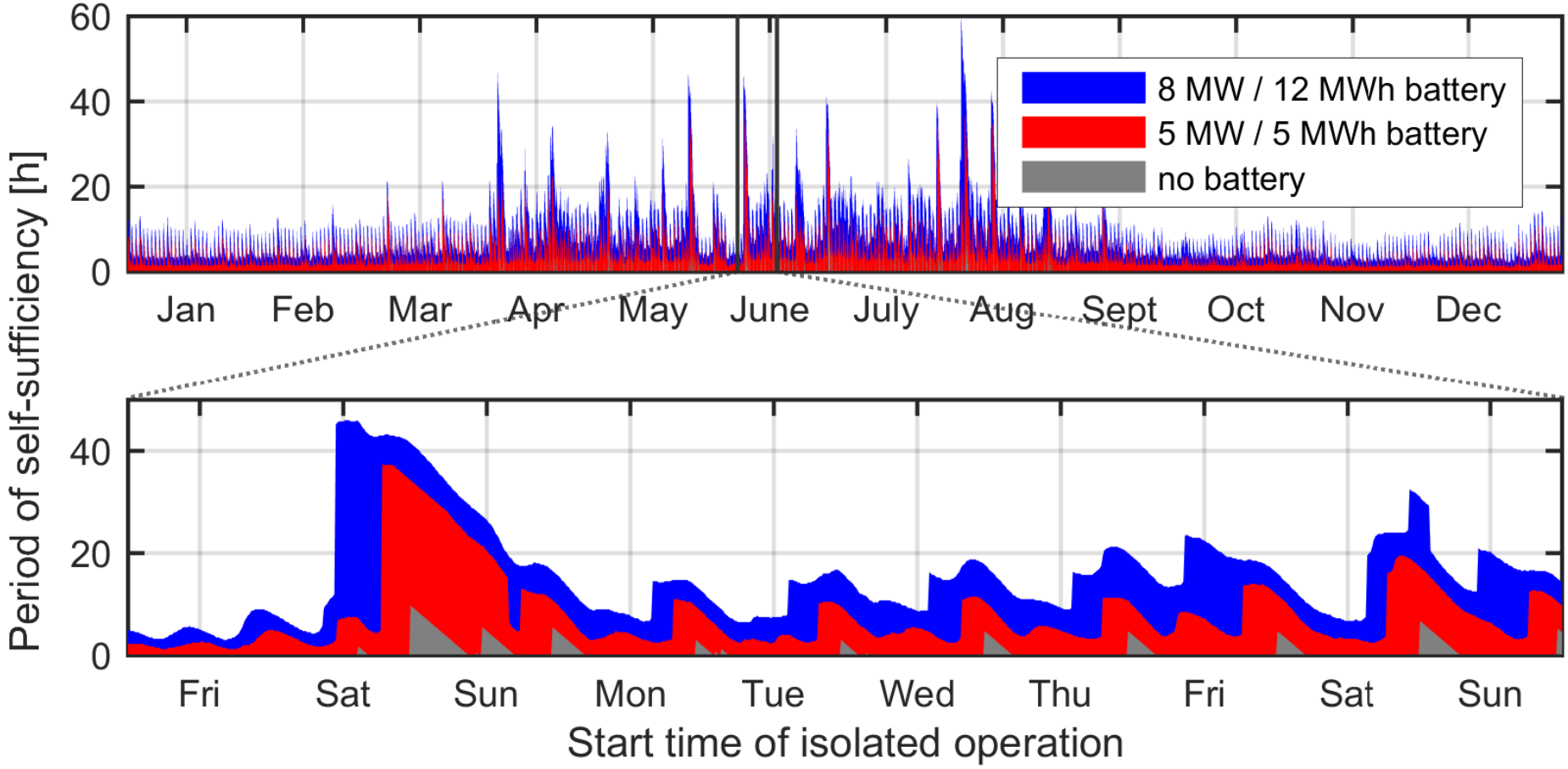
Feed- in power and demand



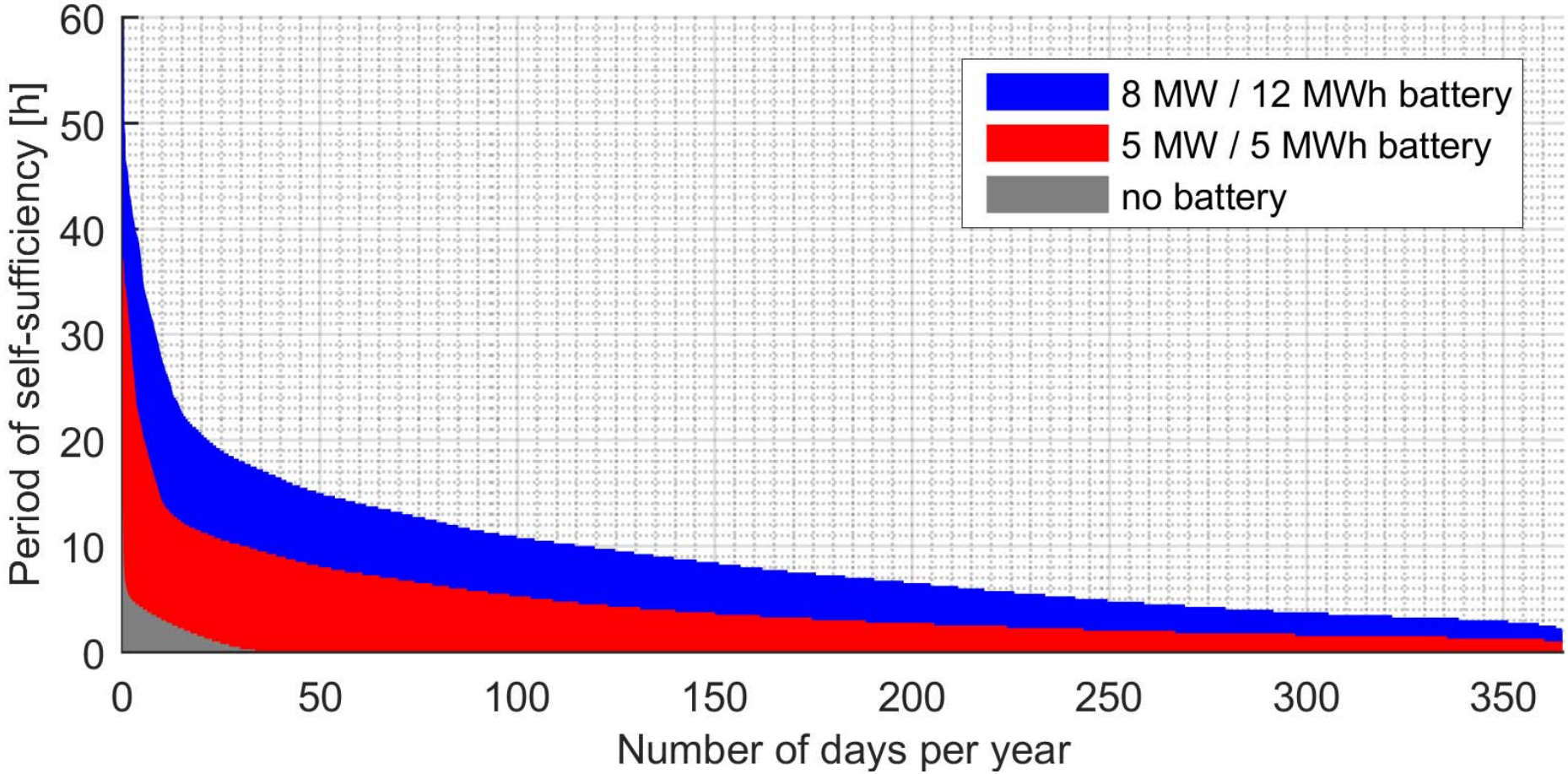
Residual load



Self-sufficiency time



Self-sufficiency time: Annually sorted



Conclusion

In Bordesholm:

- Battery needed in case of blackout to provide…
  - Self-sufficiency time of 3h to 20h all over the year
  - Time for further measures

Contact

Prof. Dr. Eberhard Waffenschmidt
CIRE - Cologne Institute for Renewable Energy
Cologne University of Applied Sciences
Betzdorferstraße 2, 50679 Köln,
eberhard.waffenschmidt@th-koeln.de
www.th-koeln.de/personen/eberhard.waffenschmidt/
and www.100pro-erneuerbare.com