

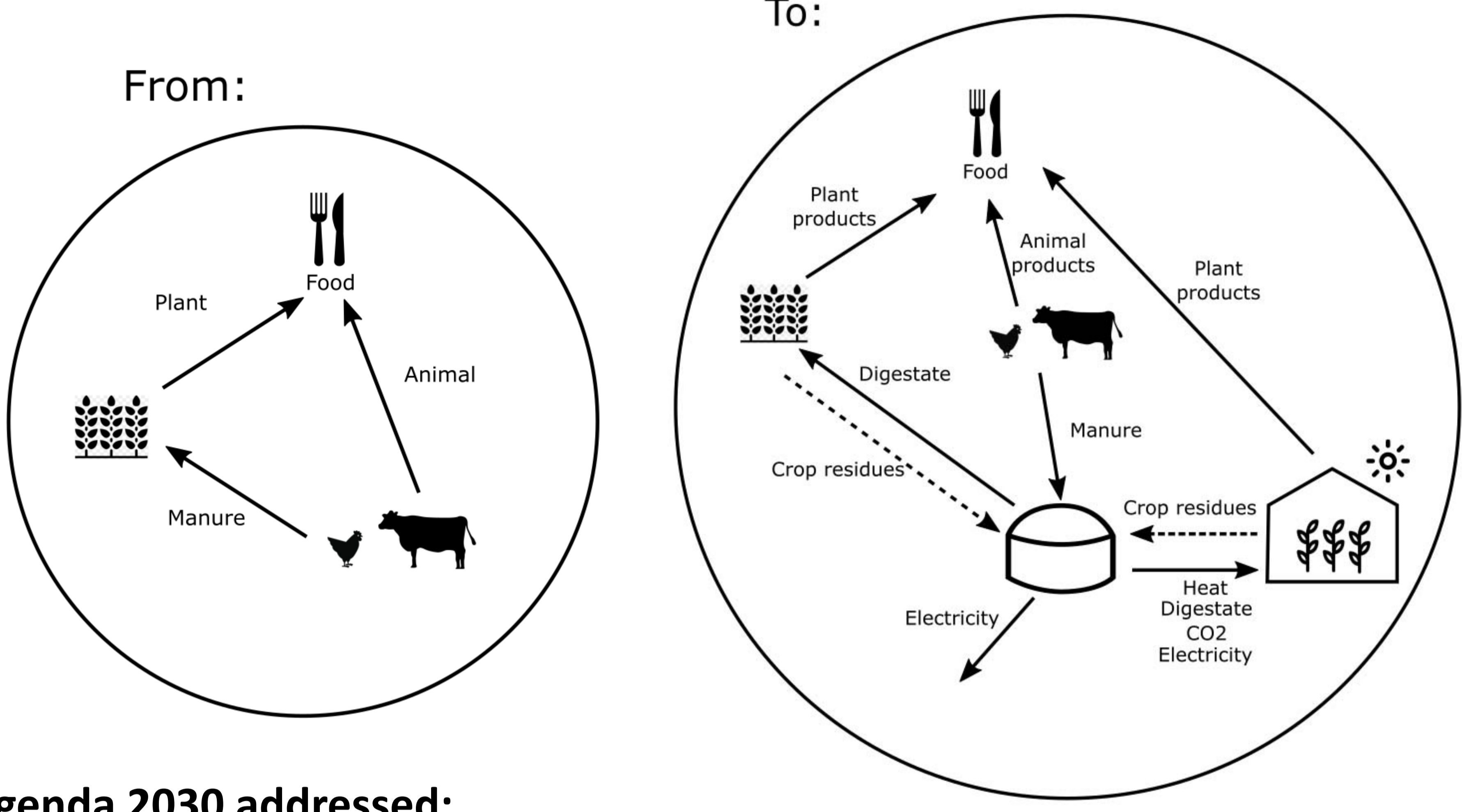
Symbiosis opportunities between food and energy system: manure based biogas as heat source for greenhouses

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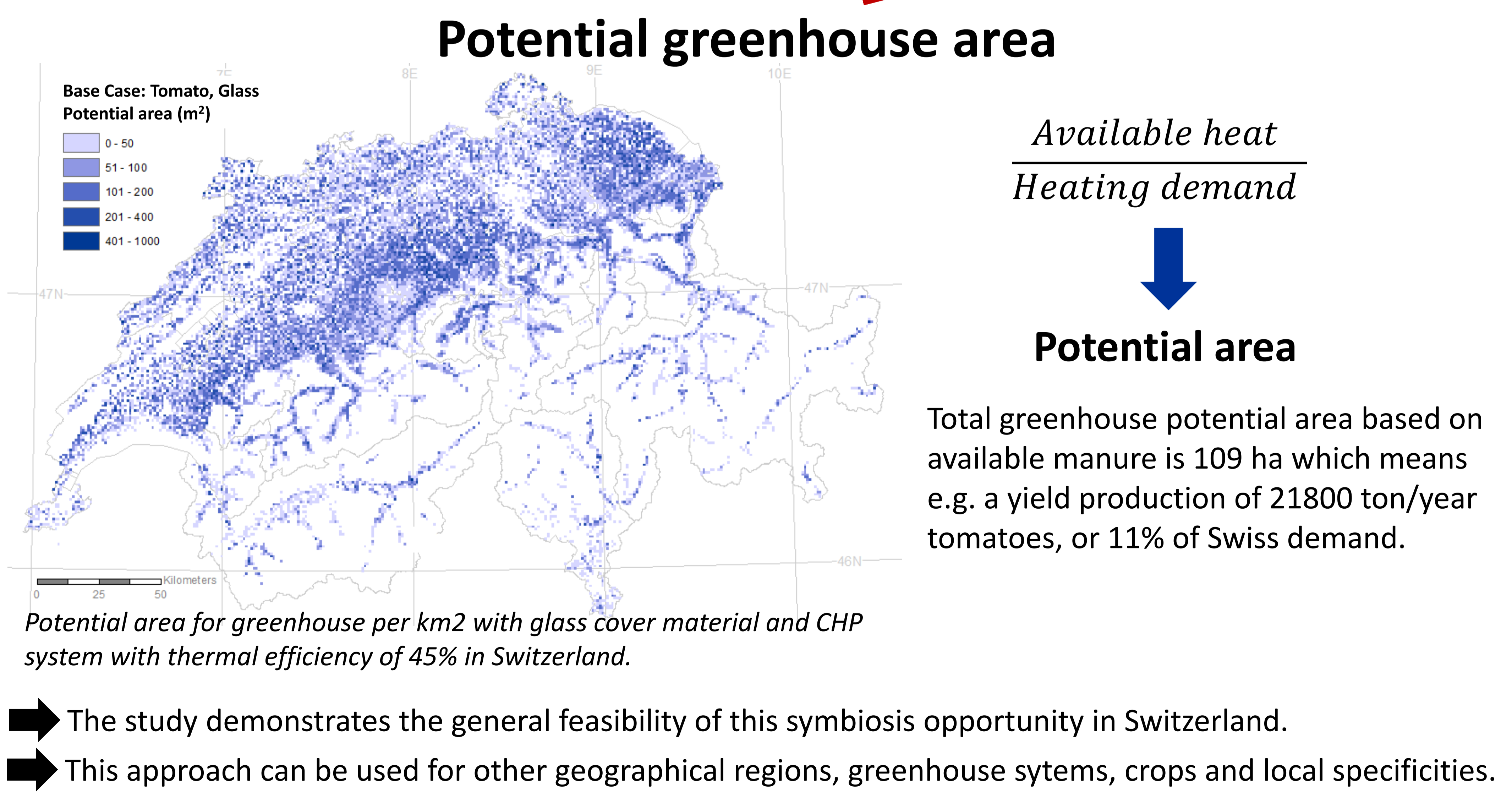
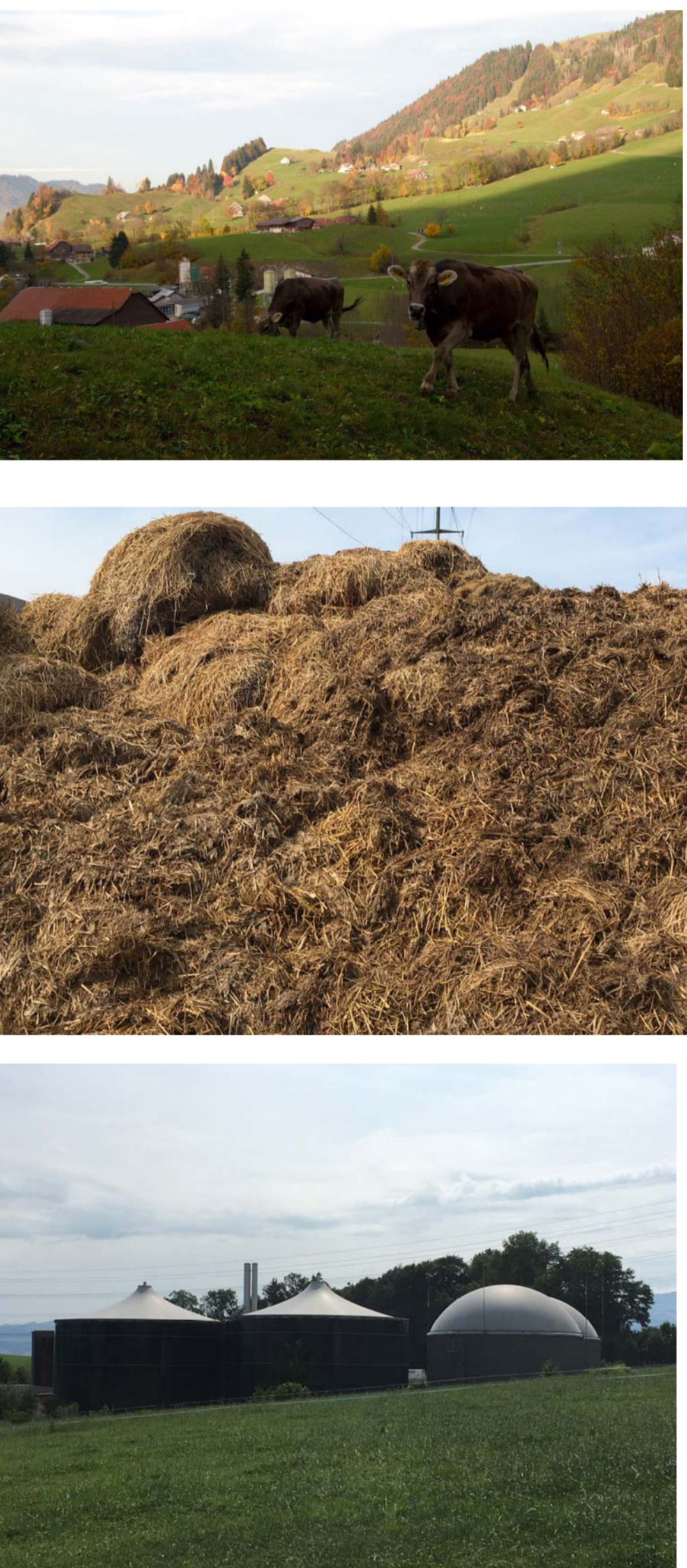
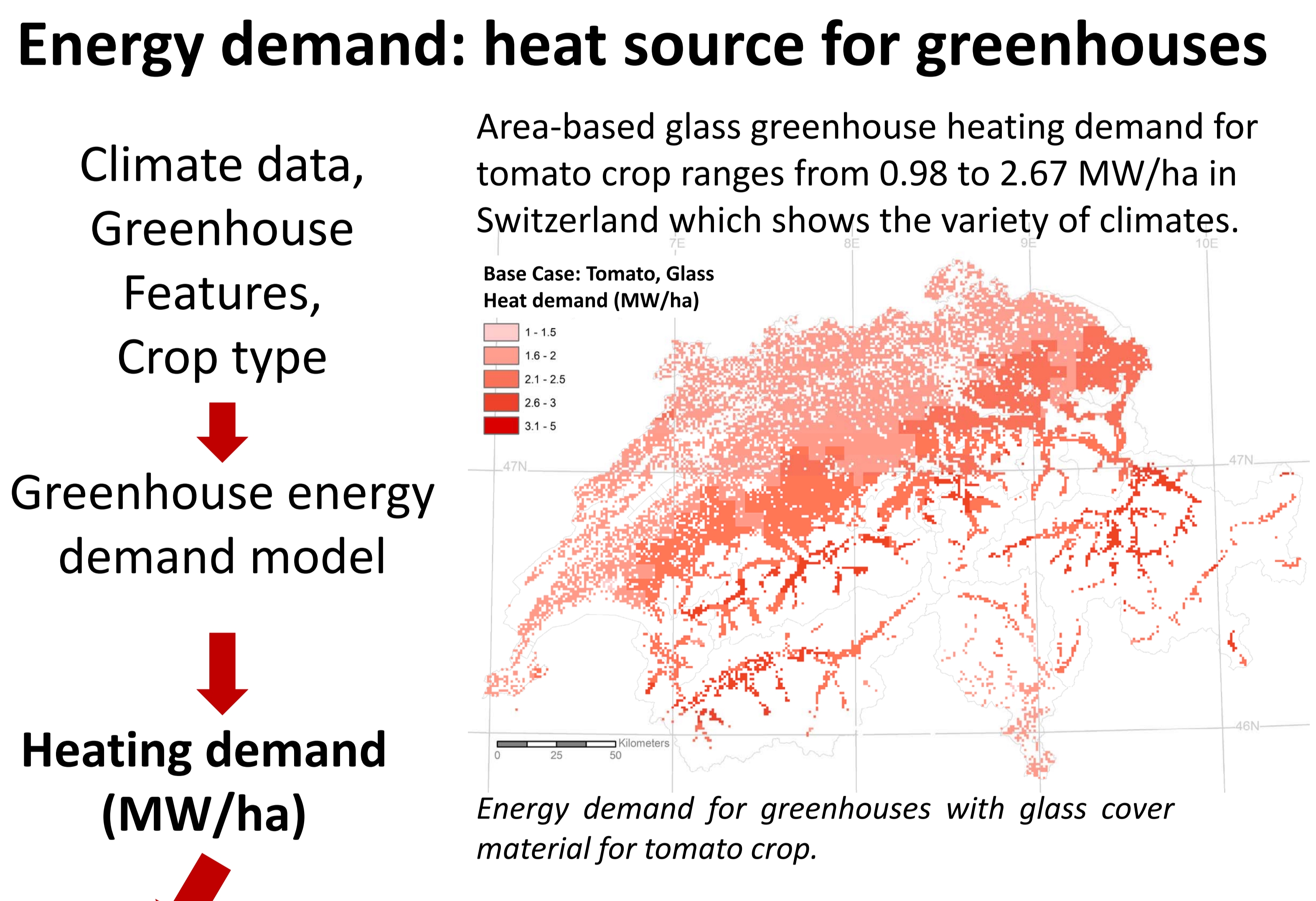
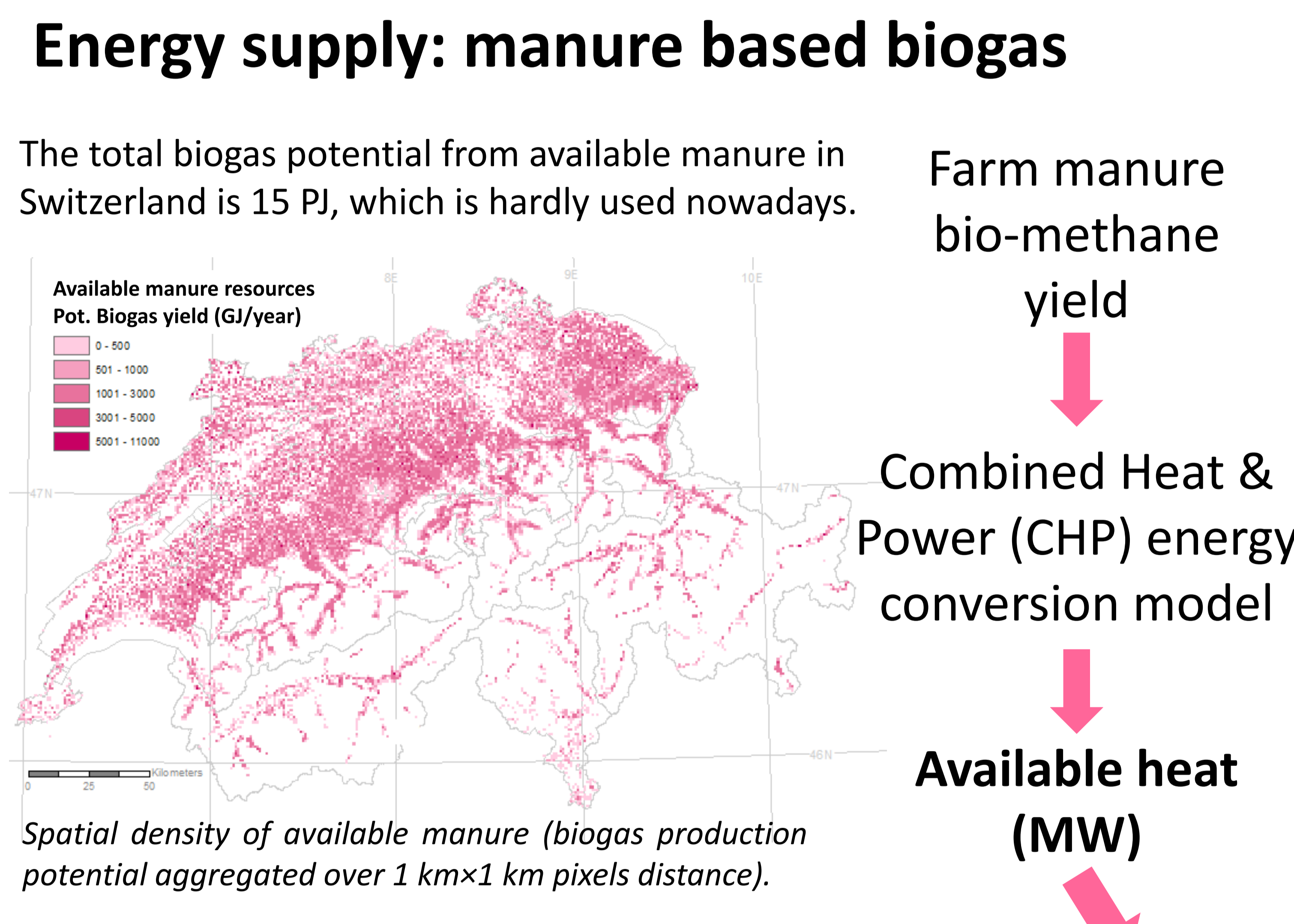
Greenhouse systems offer many benefits compared to open-field agriculture, including supply chain reliability and high crop yields. However they also need energy. Here, the symbiosis between manure based biogas and greenhouse food production is demonstrated.

From a previous study*, treating available manure in Switzerland through anaerobic digestion could reduce the emission by 346 kt CO₂eq or 1.6% of the remaining Paris agreement targets to mitigate climate change (without considering further substitution effects).



Sustainable Development Goals (SDGs) of the UN Agenda 2030 addressed:

- Goal 2.** End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- Goal 7.** Ensure access to affordable, reliable, sustainable and modern energy for all.
- Goal 13.** Take urgent action to combat climate change and its impacts.



Vanessa Burg, Farzin Golzar, Gillianne Bowman, Stefanie Hellweg, Ramin Roshandel. *Symbiosis opportunities between food and energy system: the application of manure based biogas as heat source for greenhouses* (in prep.).
 * Burg, V., Bowman, G., Haubensack, M., Baier, U., & Thees, O. (2018). Valorization of an untapped resource: energy and greenhouse gas emissions benefits of converting manure to biogas through anaerobic digestion. Resources, Conservation and Recycling, 136 (53-62).