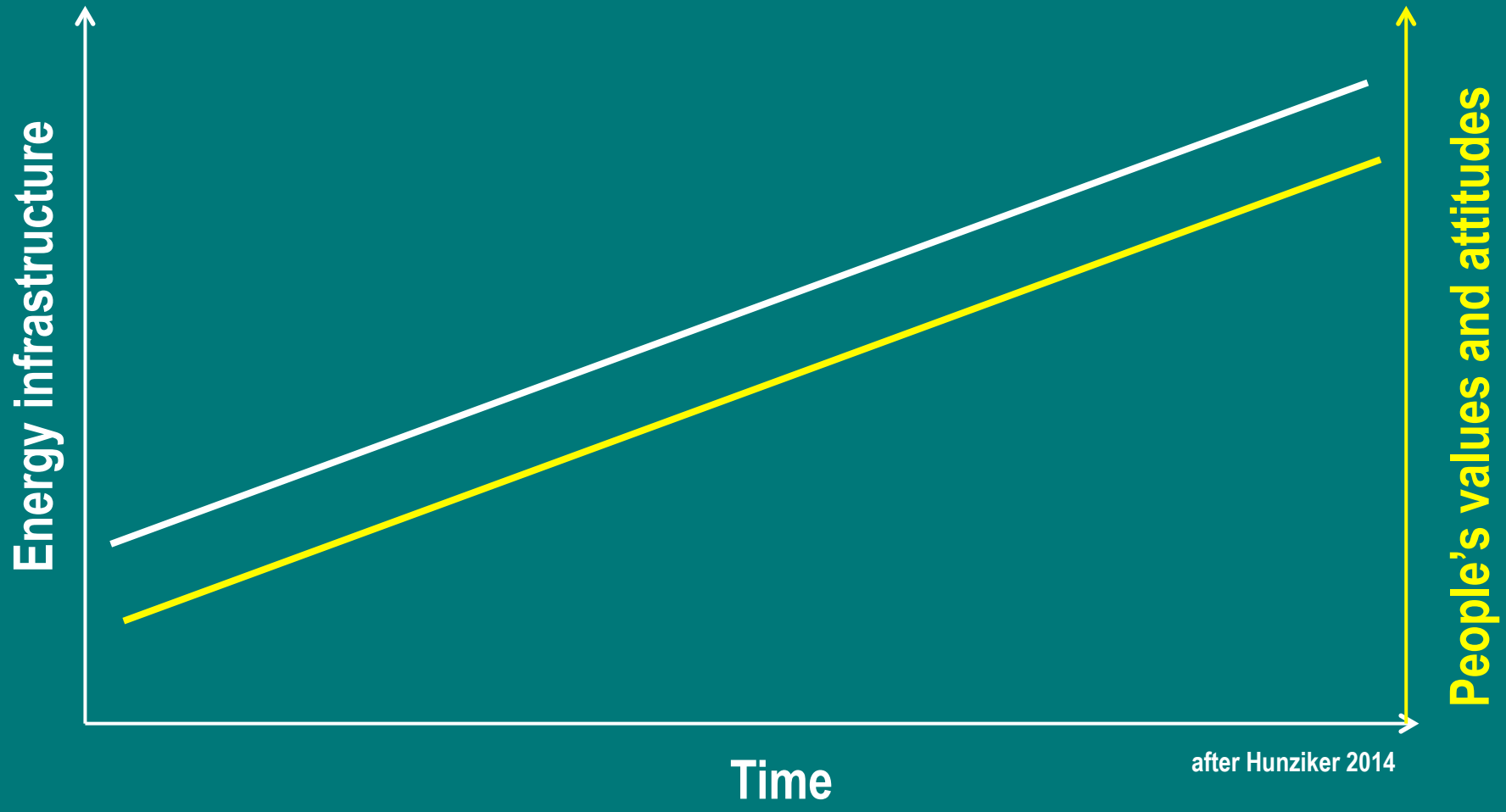
Modeling landscape-related conflicts of renewable energy in Switzerland

- **Felix Kienast,** Marcel Hunziker, Boris Salak, Anna Hersperger, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland
- Thomas Egli, Ulrike Wissen, Reto Spielhofer, Nica Huber, Victor Schinazi, Tyler Thrash, Adrienne Grêt-Regamey, ETH Zurich, Switzerland

Perceptions and meanings...



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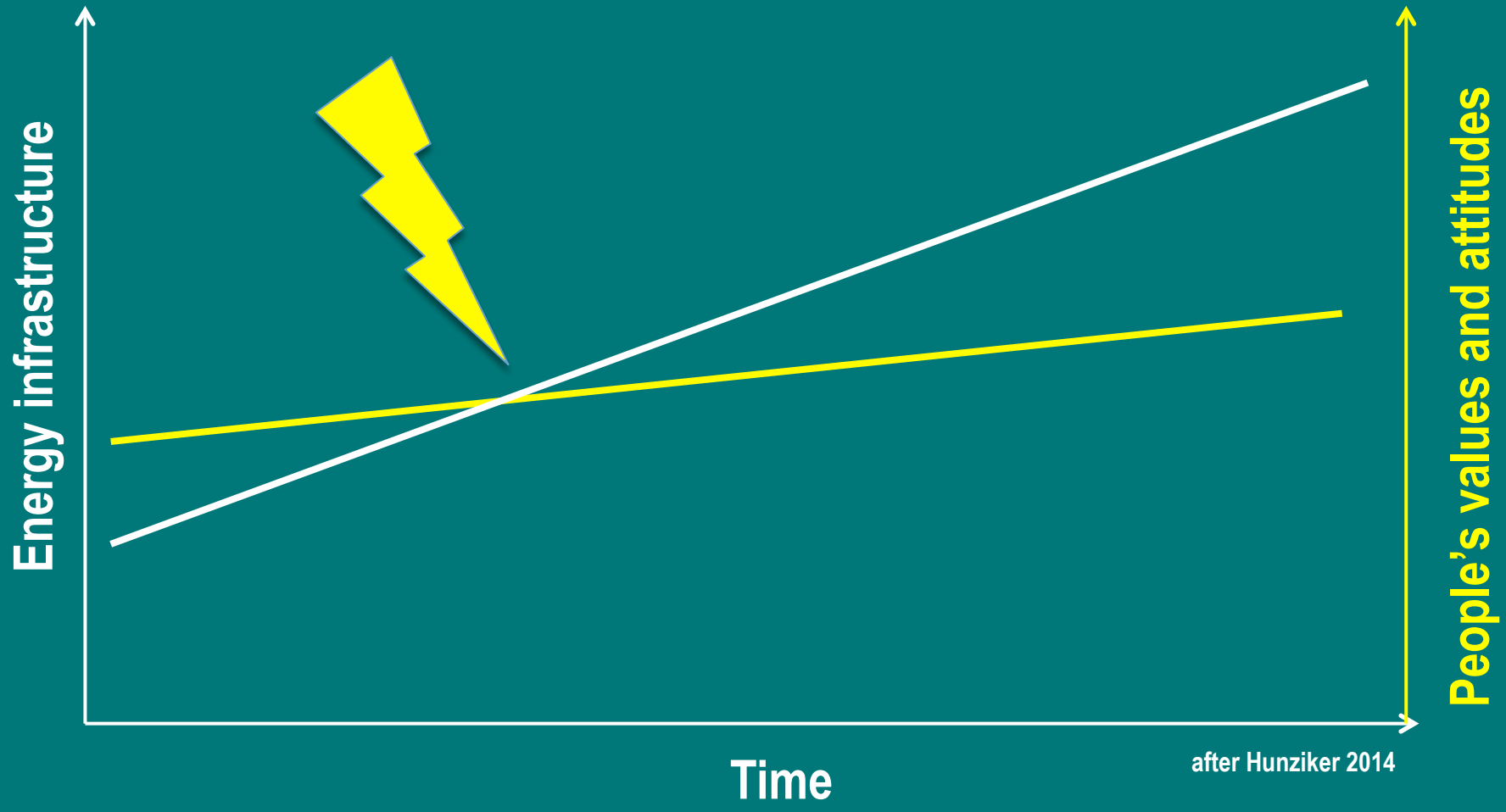
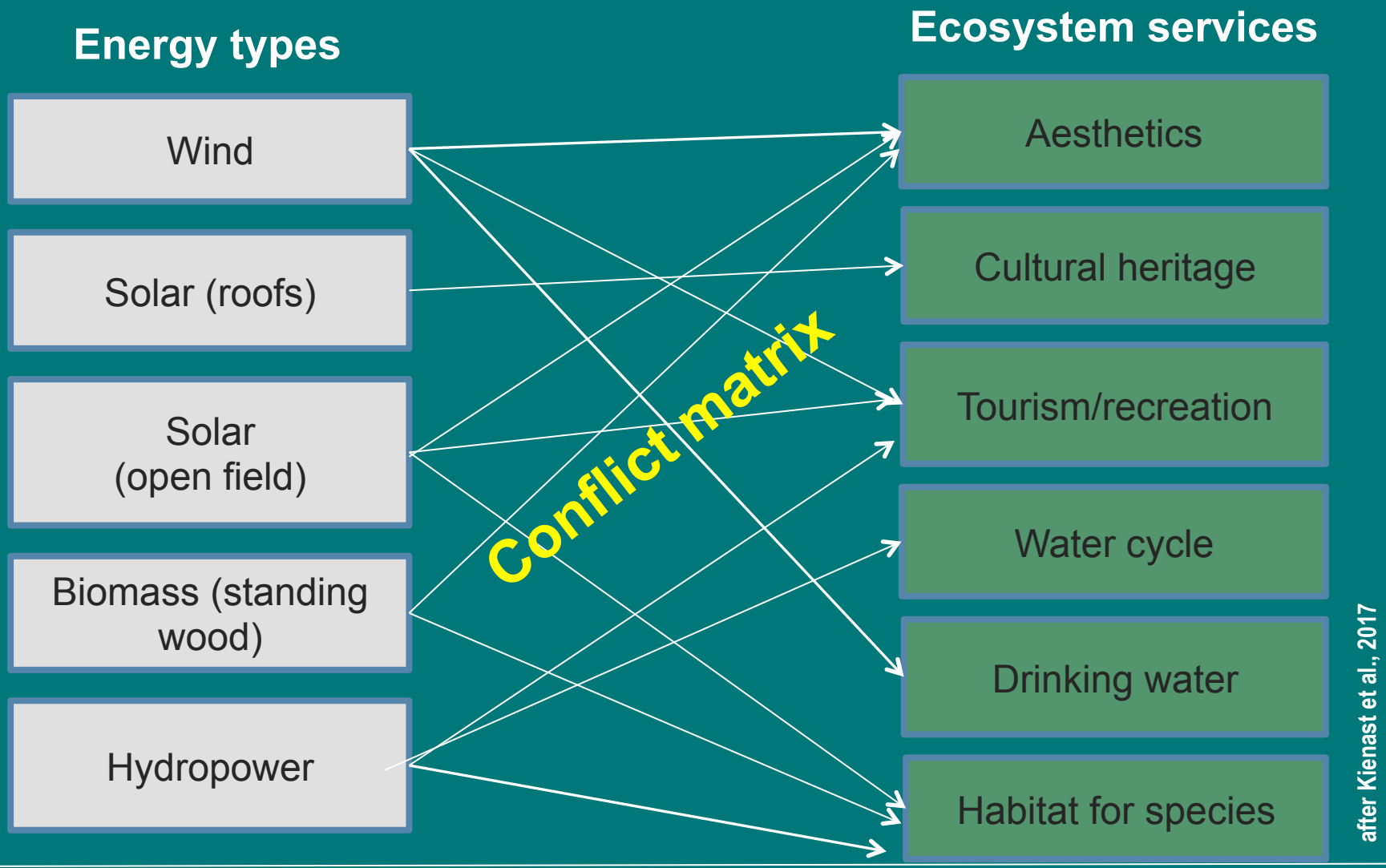


Topics covered

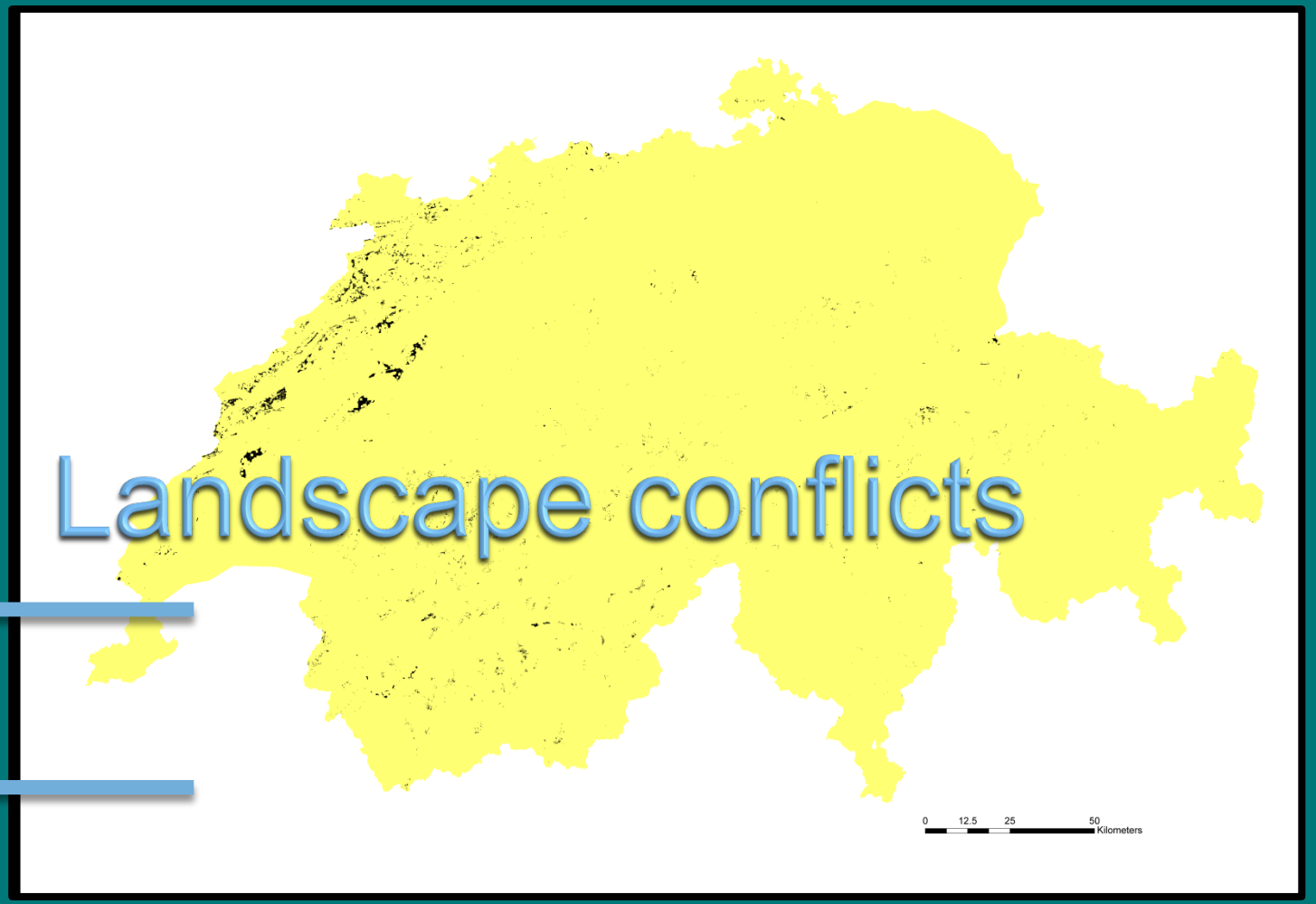
- Anticipating spatial land-use conflicts
- Using optimization software to pre-select sites with highest energy output at lowest environmental costs
- Improving the fit of renewable energy projects with virtual visual-acoustic simulations (running project)

Anticipating conflicts using the EGS paradigm



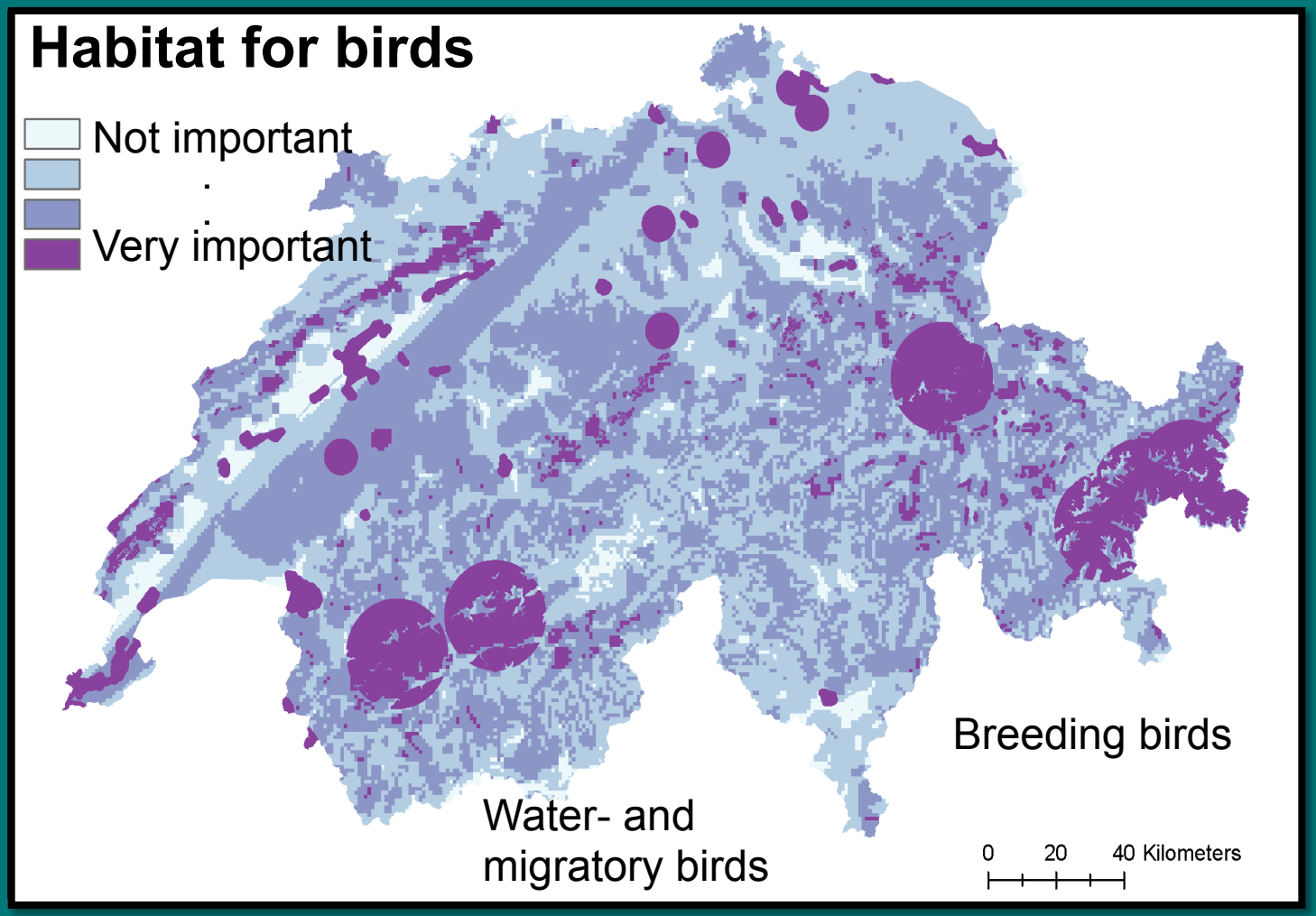
Legal constraints

- Physical
- National inventories (binding)
- National inventories (negotiable)
- Distance to settlement
- Accessibility
- Military use
- Cantonal protection
- Sites in forests excluded



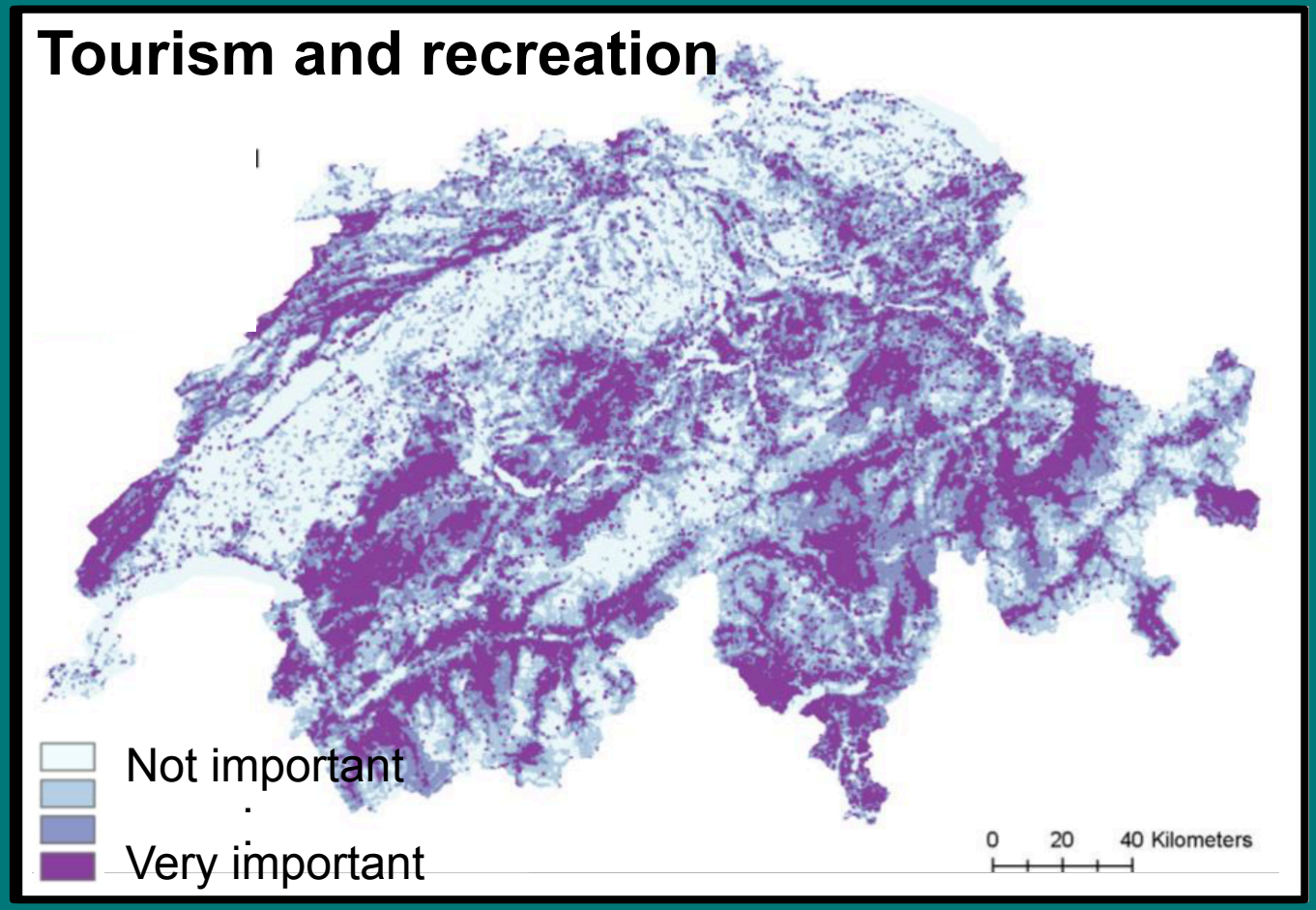
after Kienast et al., 2017

Service map “Habitat protection”



after Kienast et al., 2017

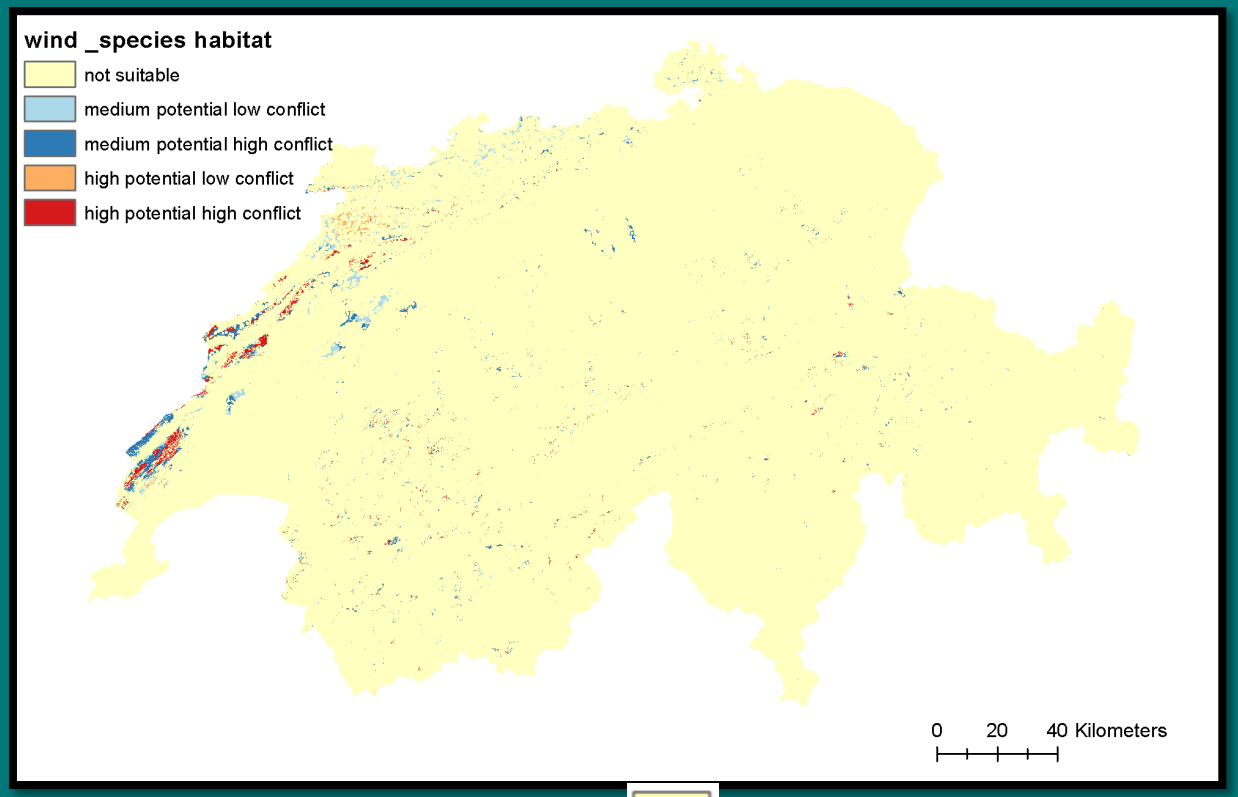
Service map “Physical and experiential interaction”



after Kienast et al., 2017

Conflict maps wind

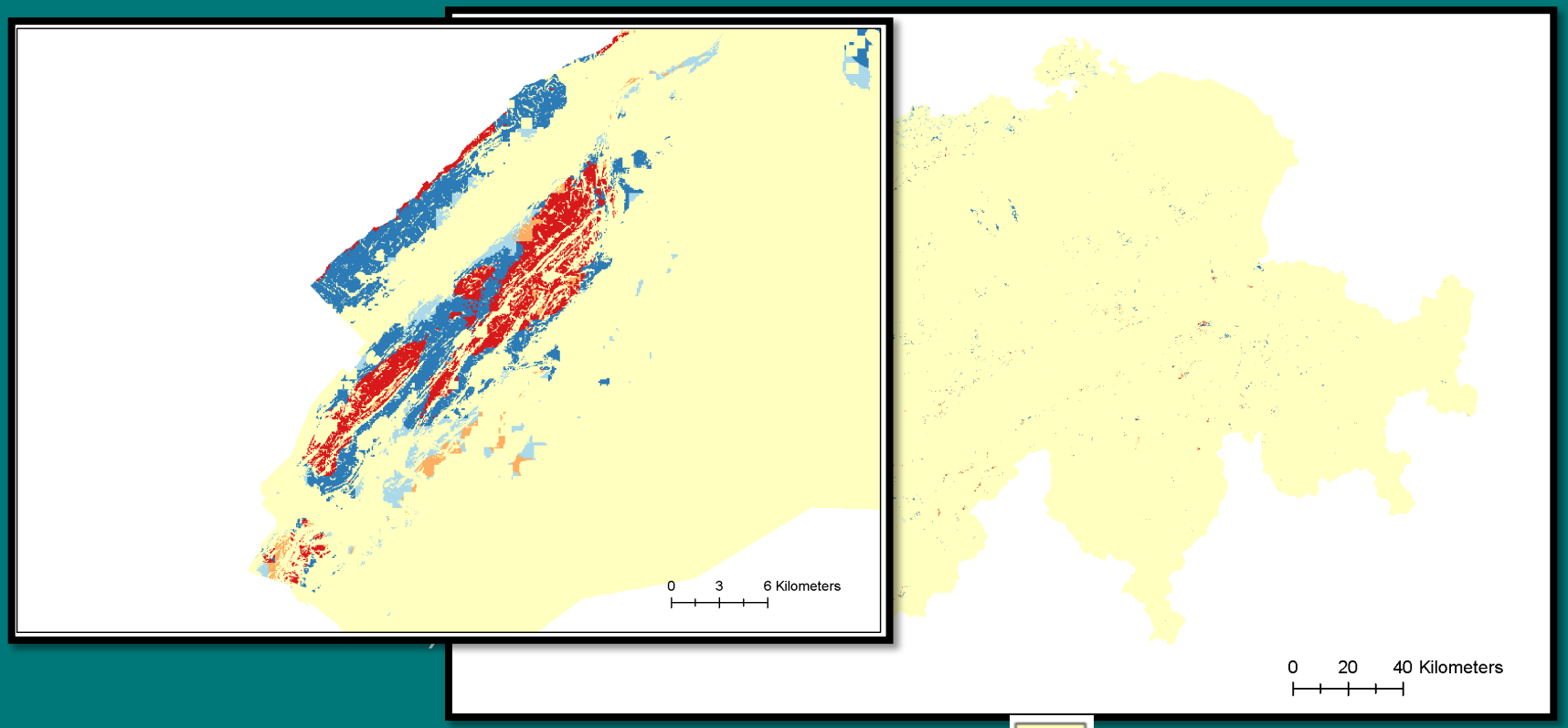
(e.g. wind with habitats for birds)



after Kienast et al., 2017

- Not suited
- Average potential/no conflict
- Average potential/ high conflict
- High potential/ no conflict
- High potential/ high conflict

Conflict maps wind



“Low-conflict” energy ~ phasing out of nuclear (25TWh/year)

	TWh/year
◆ Solar roof:	+ 7.5 +new urban areas
◆ Solar open land:	(+ 18) → + 1
◆ Solar openland on “trash land”	+ 8
◆ Wind:	+ 5.1
◆ Wood biomass	+ 3.5-5.3
◆ Water power:	+ 3 (currently 36)
◆ Geothermal, waste disposal	+ ?

after Kienast et al., 2017

Optimizing site selections

Not suited

Average potential/no conflict

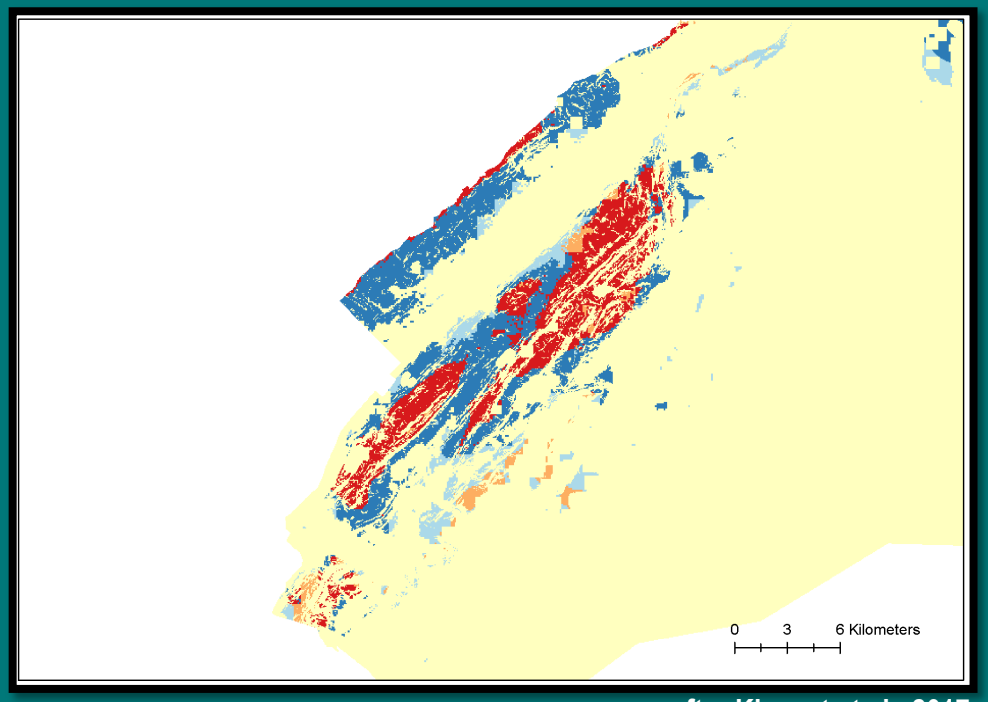
~~Average potential/ high conflict~~

High potential/ no conflict

~~High potential/ high conflict~~

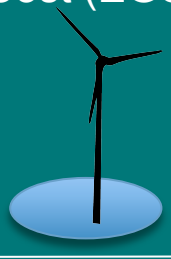
MARXAN

Energy gain



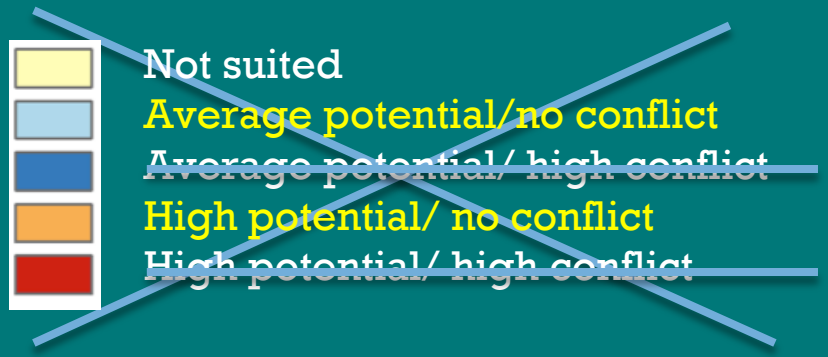
after Kienast et al., 2017

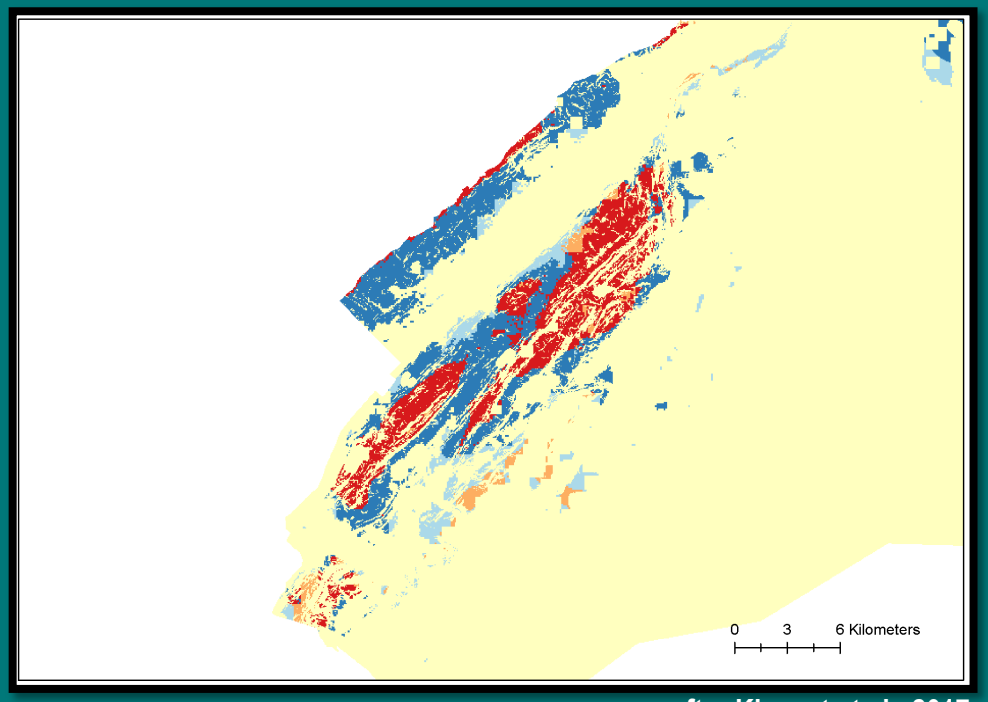
Cost (EGS)



after Egli et al., 2017

Optimizing site selections





after Kienast et al., 2017

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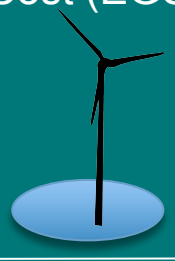
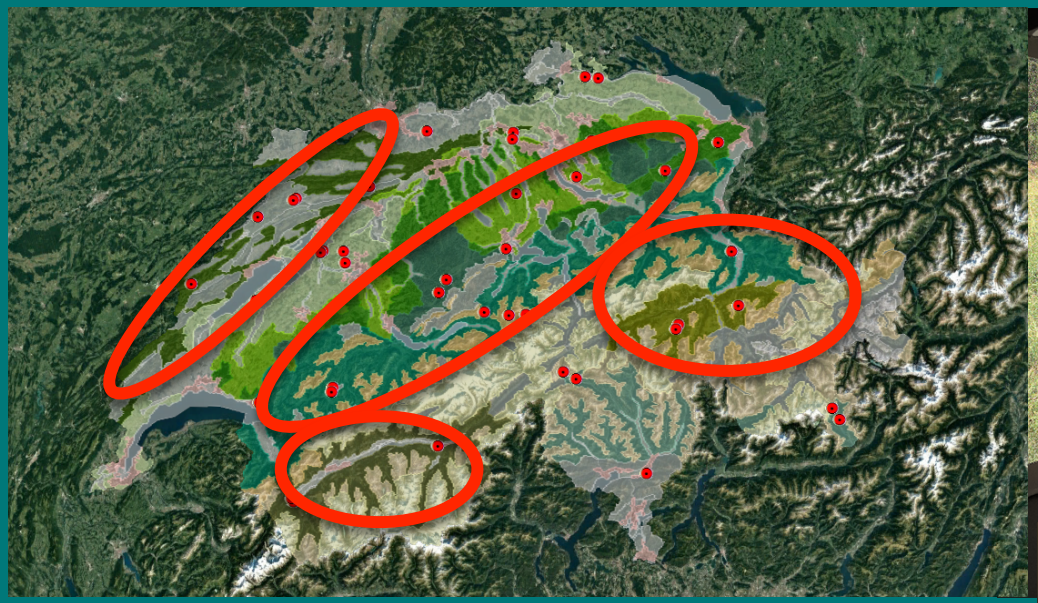
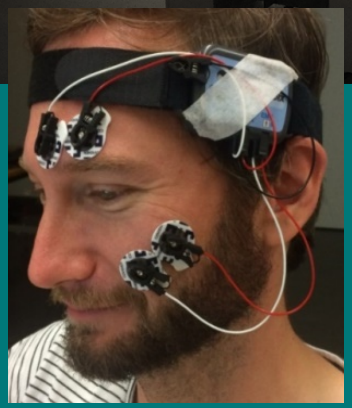


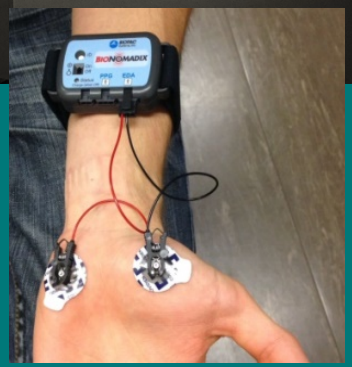
Iterative search for sites with highest gains at lowest cost

- Indispensable sites
- Less sites and a better solution → 13.5% less sites
- difficult to explain to NGOs and policy makers

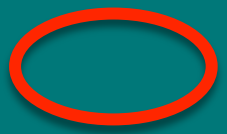
Improving the fit of renewable energy projects







Expected „energy horse“ areas



Source: ENERGYSCAPE project: https://www.wsl.ch/de/projekte/energyscape.html

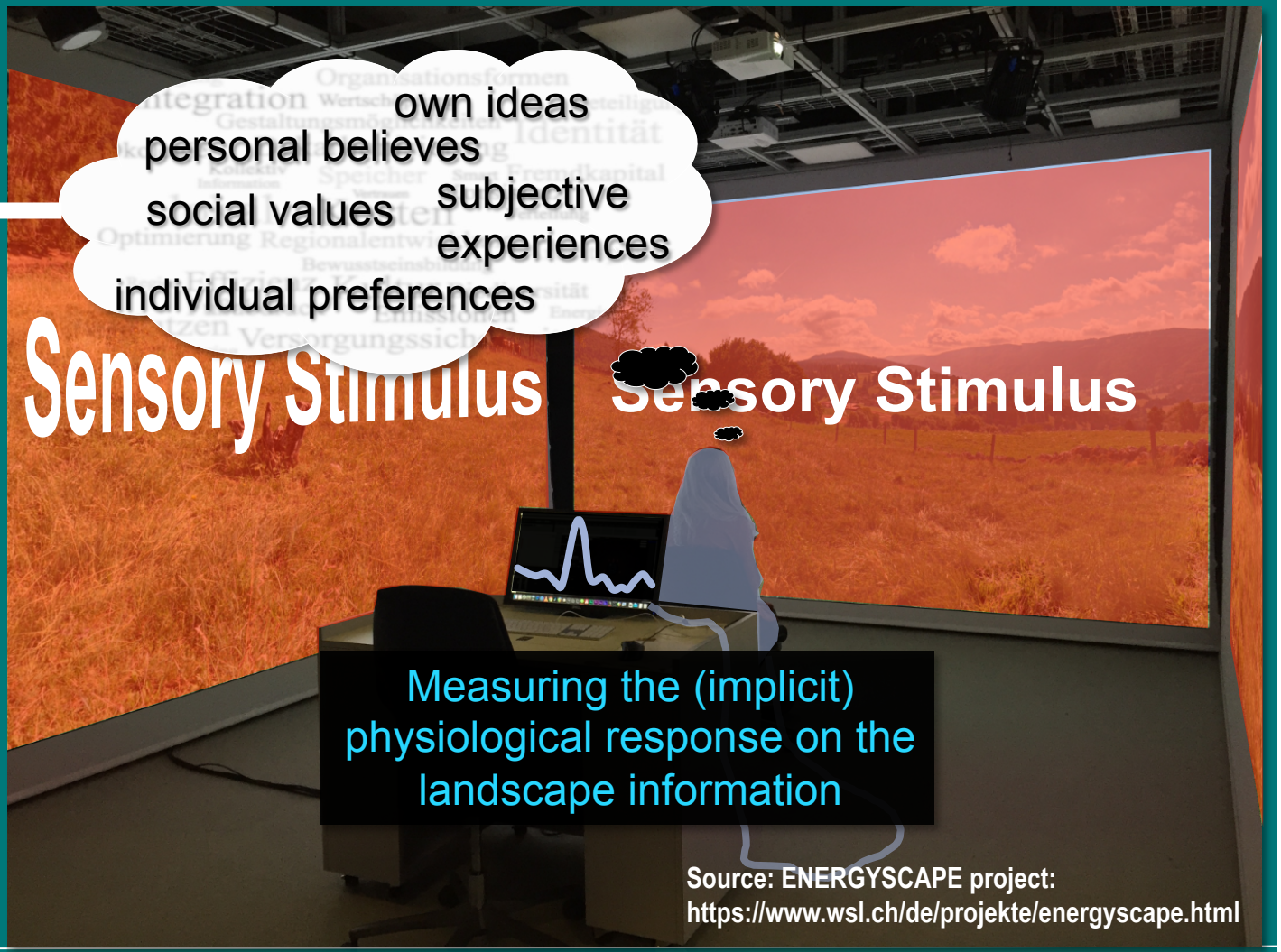
Vistas for the preference study

Source: ENERGYSCAPE project: https://www.wsl.ch/de/projekte/energyscape.html

Laboratory Experiment

Questionnaire

Survey on the (explicit) cognitive response on landscape information



Online Panel Survey

own ideas
Decarbonisation
Identity
social
individual
values
Costs
experiences
personal preferences
Biodiversity
Carbon Footprint
…

additional knowledge with selected information

preference through cognitive evaluation

Source: ENERGYSCAPE project:
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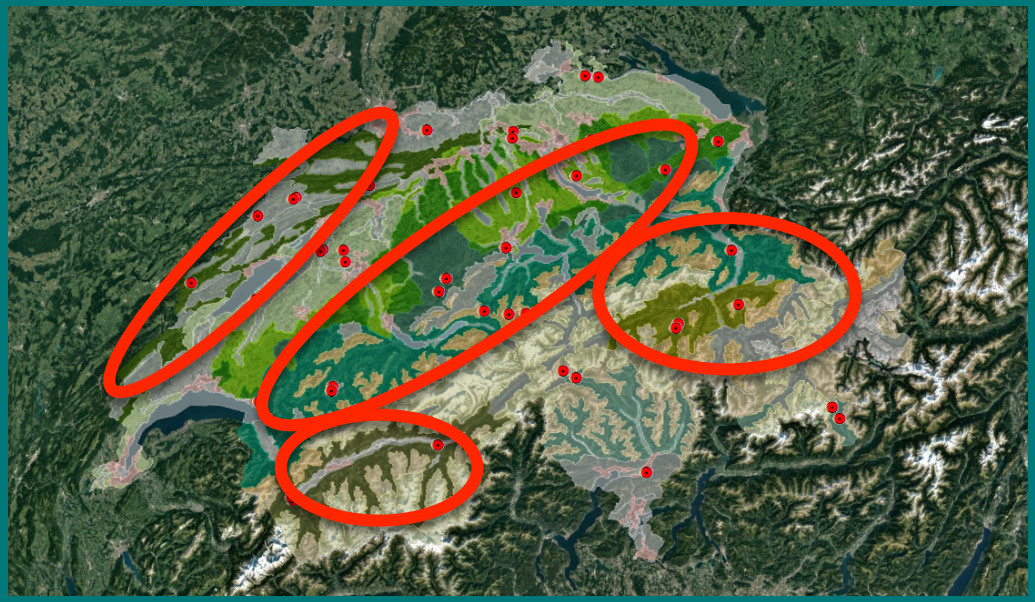
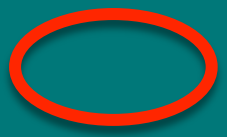
WSL ETH zürich felix kienast et al.

Expected results in a nutshell:



- Region-specific **meanings** of energy infrastructure
- Region-specific **acceptance** of energy infrastructure
- No Go areas

Expected „energy horse“ areas



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Take home message…

- Examples of both a top-down and a participatory planning exercise
- Reduce NIMBY problem (Devine-Wright, 2009)
- Evaluate the meanings of renewable energy in landscapes
- Improving the visual/contextual/meaning fit of renewable energy projects
- BUT: We are still awaiting evidence that the approach works in the real planning practice

Thank you