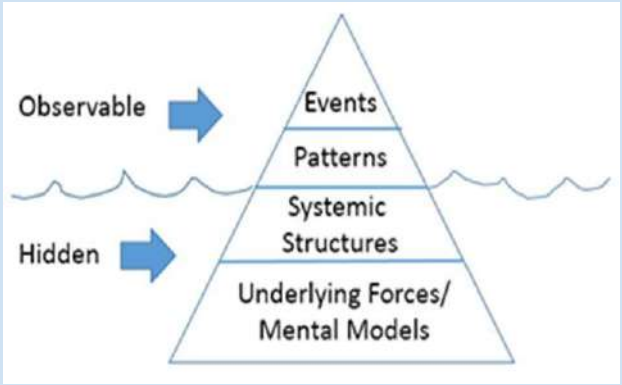
Biodiversity: Economics v Financials

E4S Biodiversity Community 2024-03-05

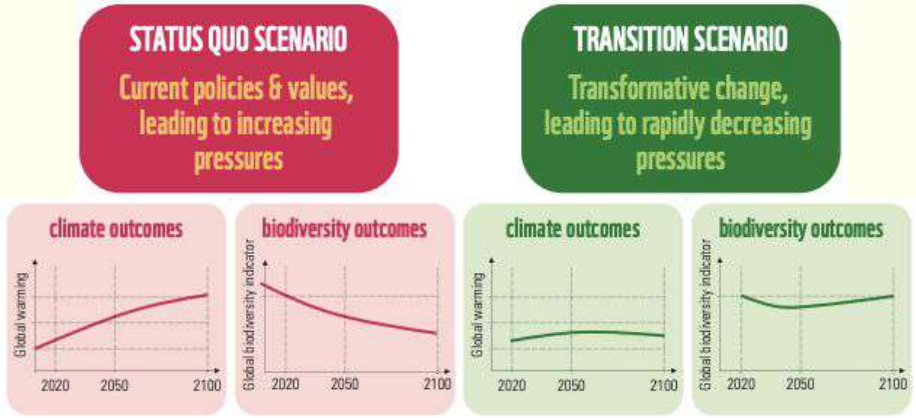
Sascha NICK

A systems perspective of climate and biodiversity

Iceberg model



Monat et al. 2020



Adapted from WWF Living Planet Report 2022

climact.ch/project/towards-new-renewable-energy-developments-in-switzerland-that-preserve-biodiversity

Challenges addressed

The project highlights key challenges at the nexus of renewable energy (RE) development, biodiversity protection, and climate change mitigation. It aims primarily at identifying the potential conflict between the pressure to rapidly expand RE, specifically in sensitive Alpine regions where ecosystems are still the most intact, and the essential goal of increasing biodiversity protection, which is currently insufficient while key to mitigating climate change. As such, striking a balance between these two critical environmental imperatives poses a significant challenge.

The ways to ensure energy security during the transition to RE is particularly key, considering the risk of maintaining the dependency on imported fossil fuels in the coming years - and therefore a business-as-usual model in terms of carbon emissions - if the implementation of large-scale renewable energy infrastructure is too slow. The project also addresses the difficulty of identifying suitable locations for renewable energy installations while ensuring minimal impact on biodiversity, to guarantee that the net pressure on ecosystems does not increase, and that rare intact habitats remain protected and in good ecological condition. These challenges require careful national prioritisation of landscape usage that also takes into account spatial prioritisation of biodiversity conservation, thus coordinating efforts between cantons, which will also constitute an important dimension of the project.

The project will bring together the Swiss climate, biodiversity, and RE scientific communities. Interdisciplinary and inter-institutional collaboration is carefully considered by the project team when inviting participants, emphasising the importance of bridging gaps between various scientific domains and institutions. Lastly, the project will highlight challenges in influencing public policy and engaging diverse stakeholders, in particular through a final scientists-stakeholders workshop.

This project falls within the following Sustainable Development Goals (SDGs) and specific targets (T) mentioned here:

- SDG 3: Good health and wellbeing (T3.9)
- SDG 7: Affordable and clean energy (T7.2)
- SDG 12: Responsible consumption and production (T12.2)
- SDG 15: Life on land (T15.1, 15.4, 15.5, 15.9, 15.a)
- SDG 17: Partnership for the goals (T17.14)

Principal investigators

Prof. Antoine Guisan
ull Professor in Spatial Ecology
UNIL FBM I FGSE

Dr. Sascha Nick
LEURE ENAC EPFL

Prof. Christophe Ballif
EPFL STI

Collaborators

Prof. Raphaël Arlettaz
Université de Berne Faculté des Sciences

Sustainable Development Goals

Swiss renewable energy and biodiversity project

Project goal: Bring the Swiss **renewable energy – climate – biodiversity** scientific communities together and overcome the tension of simultaneously generating more RE and increasing biodiversity protection; → **Description**, **Website**

Project deliverables

1. A White Paper on “Alpine RE & Biodiversity”
2. An urgent action research agenda on “RE & Biodiversity” (more general than Alpine)
3. Propose and prototype a model of dialogue between the energy, climate, and biodiversity scientific communities

Timing and structure

- Initial scoping workshop: Lausanne 20.06.2023
- First scientific stakeholder workshop: Neuchâtel 03.10.2023
- Second scientific stakeholder workshop: Zurich 25.01.2024
- Final Outreach events: Bern, from April 2024, details tbd.

EPFL Sascha NICK LEURE

Mitigating biodiversity impact

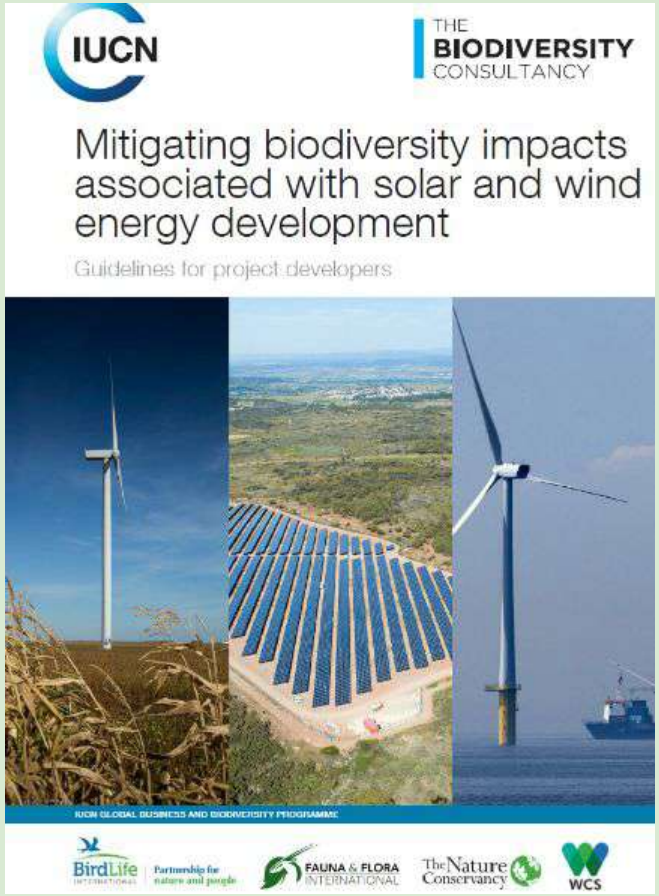


Figure 2.6 Example of how an appropriate biodiversity goal for a project can be defined based on the biodiversity significance of the area

BIODIVERSITY SIGNIFICANCE	LOW MODIFIED HABITAT - NOT SUPPORTING PRIORITY BIODIVERSITY	HIGH NATURAL HABITAT - FEASIBLE TO OFFSET RESIDUAL IMPACTS AS A LAST RESORT	VERY HIGH CRITICAL HABITAT - FEASIBLE TO OFFSET RESIDUAL IMPACTS AS A LAST RESORT	OUTSTANDING CRITICAL HABITAT - RESIDUAL IMPACTS NOT OFFSETABLE
PROJECT BIODIVERSITY GOAL	REDUCED HARM	NO NET LOSS	NET GAIN	NO HARM

INCREASING PROJECT BIODIVERSITY RISK

5

Impact avoidance through site selection is the most effective mitigation measure

Swiss Negative Emissions Fund – paying for Net Zero

March 15, 2022 | Documents

Sascha Nick (EPFL)

Philippe Thalmann (EPFL)

In this paper, we propose setting up a fund to finance the removal of all Swiss territorial GHG (greenhouse gas) emissions from 2030. The fund will accelerate decarbonization and help reach annual net zero emissions around 2040, and then progressively remove all past emissions emitted from 2030. The fund will be entirely funded by emitters, based on the "polluter pays" principle, with no taxpayer money involved. The background information and analysis can be found in our December 2021 E4S White Paper "***Carbon removal, net zero, and implications for Switzerland***".

Climate and biodiversity: common action

Wetlands, Switzerland, 1800 : 2500 km^2 (6% of country area)

Organic soils, 2022 : 1000-1500 km^2 (non-localized, emitting ca. 4 Mt CO_2)

Organic soils, 2022 : 280 km^2 (localized, emitting ca. 1 Mt CO_2)

Wetlands 2022 : 15 km^2 of which 1.5 km^2 healthy

Wetlands, Switzerland, 2050-2070: 1000 km^2

Overall target: 30% reserved for biodiversity

Sascha NICK
LEURE

Model results

Full renovation of the Swiss building stock:

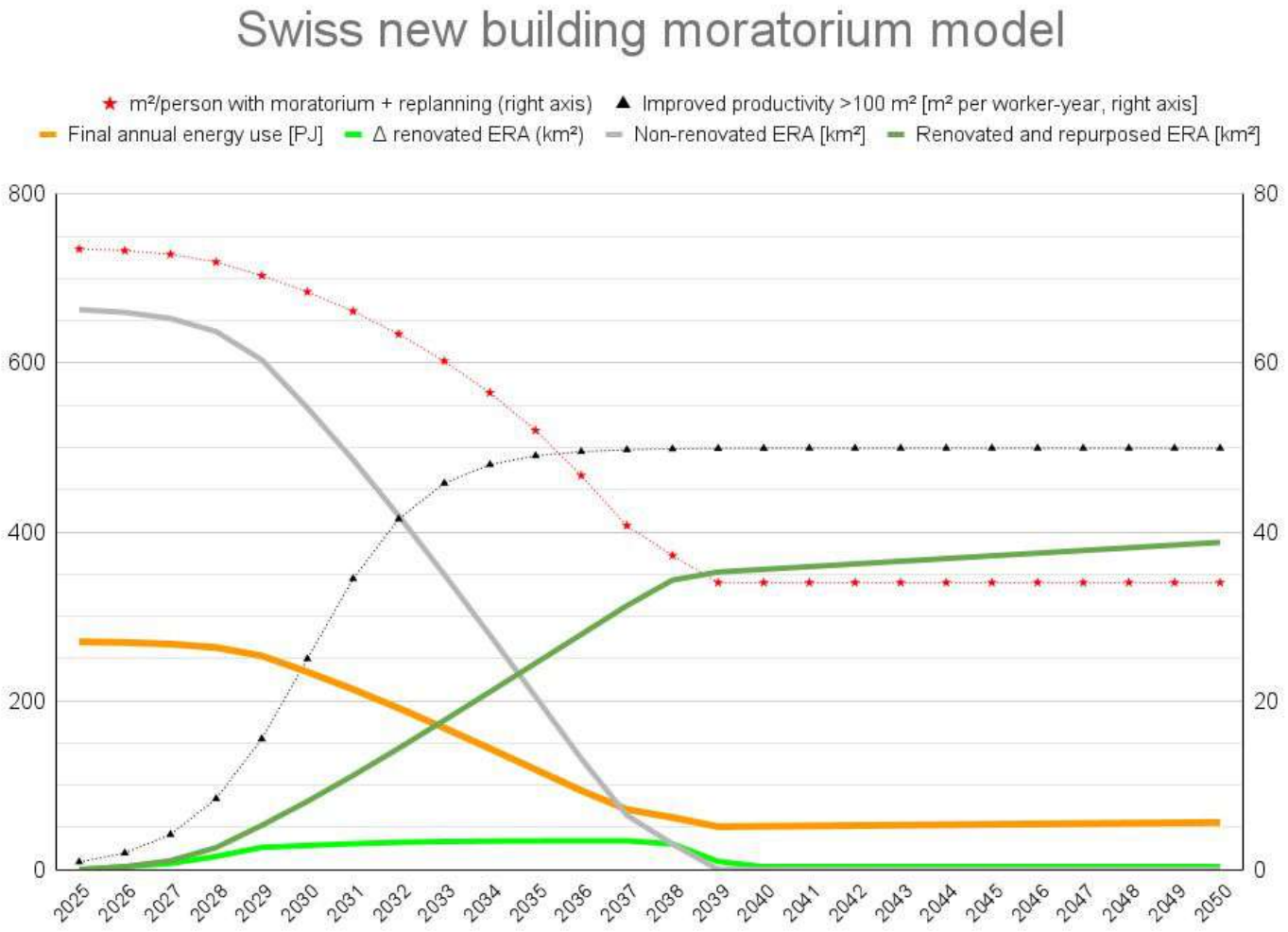
125 → 14 years

27.9% of m^2 not needed

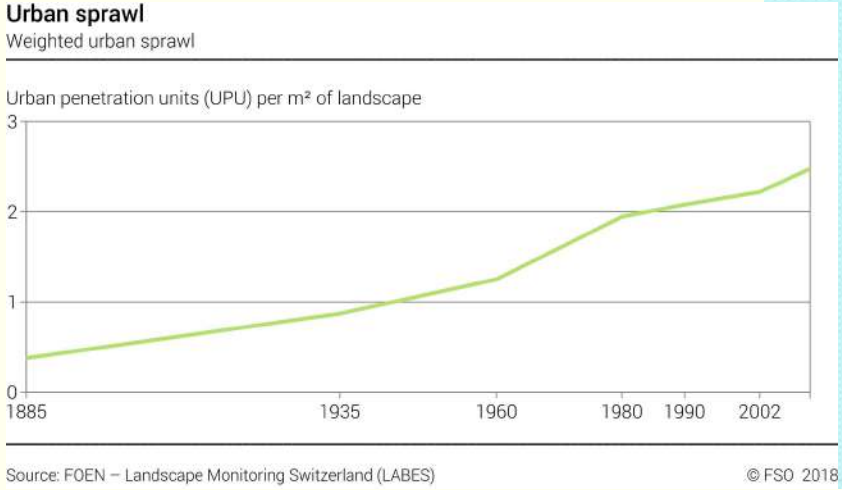
Bottlenecks: initially **vacancies (0.5%)**, then **available workers**

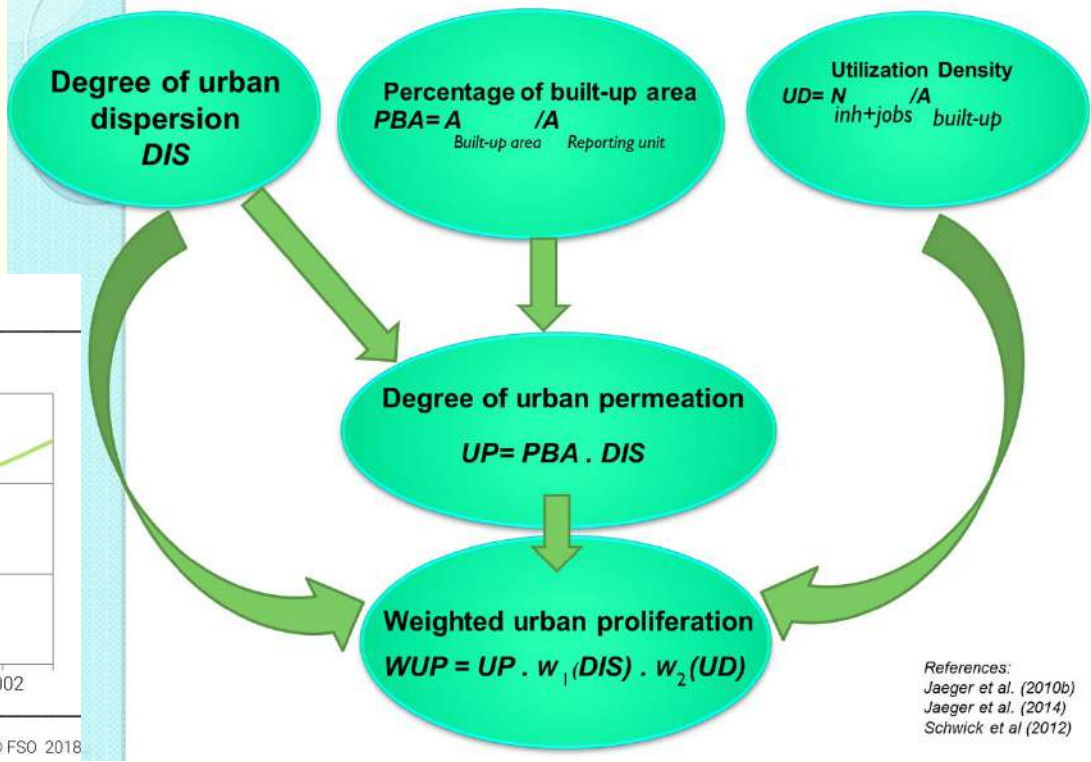
Assumptions:

80% of workers remain in construction after moratorium; 100 m^2/year renovated per worker, increasing to 150 m^2/year over 10 years (S-curve)



Reversing Swiss urban sprawl





WUP = PBA * DIS * w1(DIS) * w2(LUP)

DIS [UPU/m2] = 2.2179 * LN(total built area [km2]) + 27.714

w1(DIS) = EXP(0.294432 * DIS - 12.955) / (1 + EXP(0.294432 * DIS - 12.955)) + 0.5

w2(LUP) = EXP(4.159-613.125 / LUP [m2/cap]) / (1 + EXP(4.159-613.125 / LUP [m2/cap]))

Reversing Swiss urban sprawl to 1885 levels by 2040