

SWICE

Sustainable Well-being for the Individual and the Collectivity in the Energy transition
Bien-être durable pour les individus et la collectivité dans la transition énergétique



VIVRE ET TRAVAILLER AU SEIN DE LA TRANSITION

Prof. Philippe Thalmann, EPFL
Igor Andersen, Urbaplan

CONSORTIUM SWICE

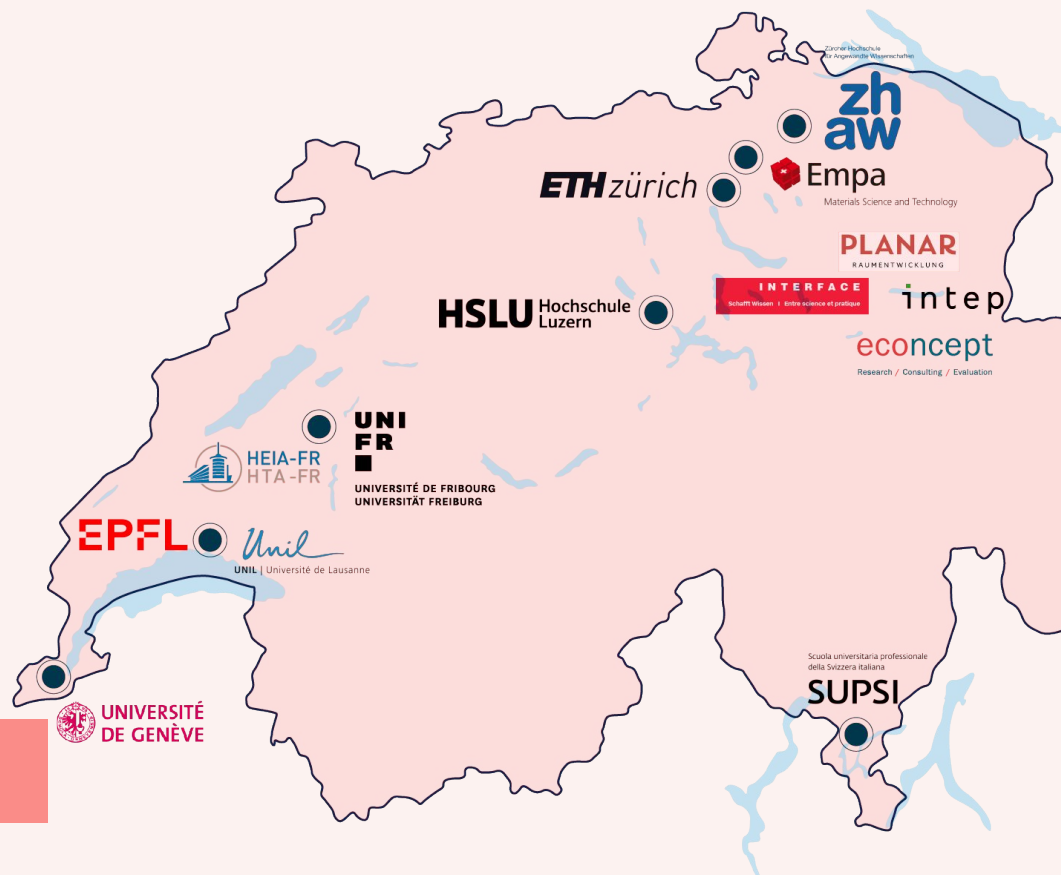
- 10 universités et hautes écoles + TU-Vienne
- 4 entreprises de recherche et consulting
- Coordination par l'EPFL

PARTENAIRES DE COOPERATION

- 5 entités du secteur public
- 7 entités du secteur privé
- 3 entreprises publiques
- 5 organisations à but non-lucratif

PLUS DE 60 AUTRES PARTIES PRENANTES

- 11 entités du secteur public
- 28 entités du secteur privé
- 18 organisations de la société civile
- 5 institutions académiques



Secteur public



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Federal Office for Spatial Development
ARE



Risch Rotkreuz



Stadt Winterthur



Secteur privé



urbaplan

MEP

Akustik & Bauphysik AG

ZugEstates



bluefactory

Entreprises publiques



SBB CFF FFS



groupe e

Recherche et associations



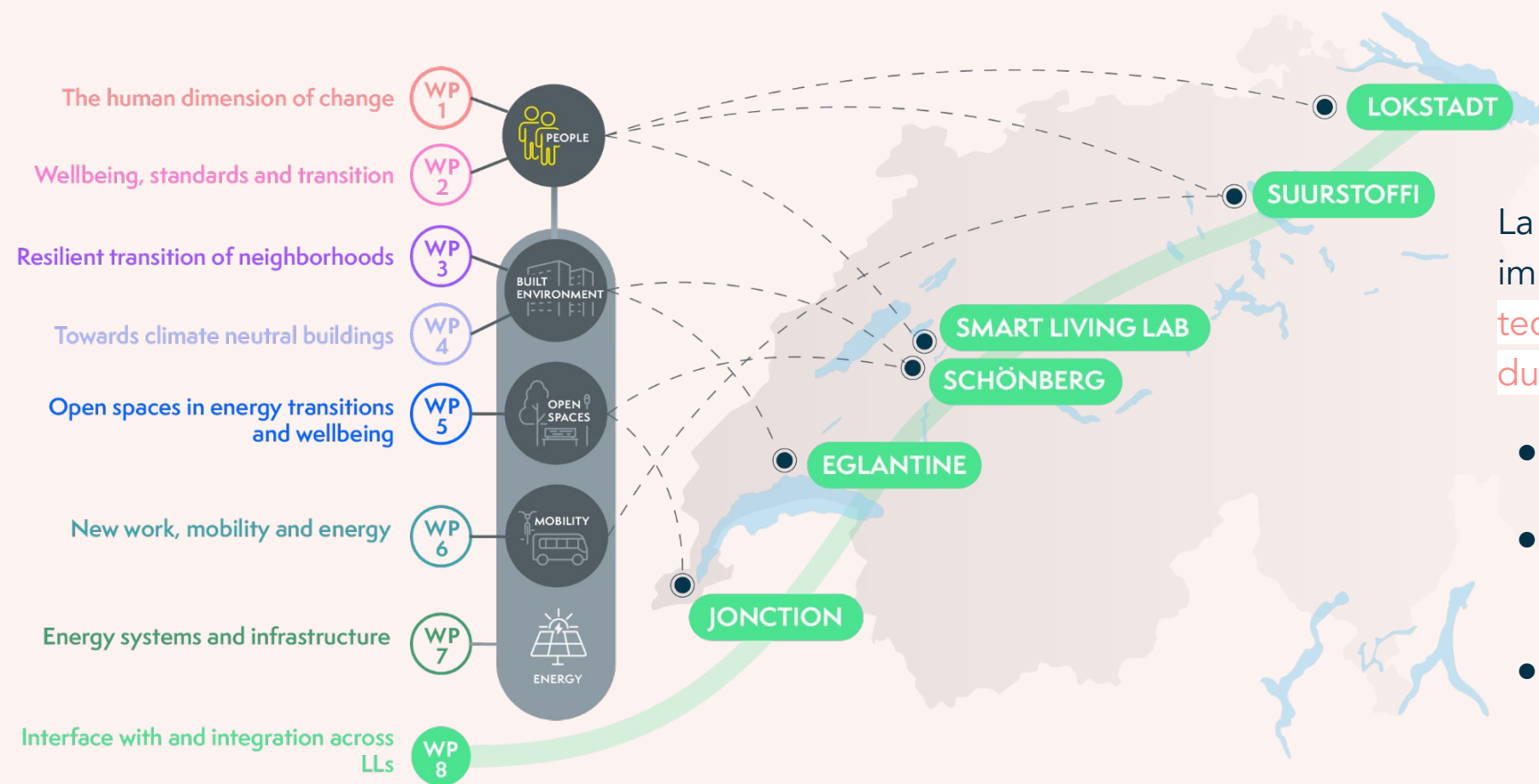
Angestellte Schweiz



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OBJECTIF DE SWICE


Avancer dans la transition énergétique en intégrant le bien-être



La recherche de SWICE évalue et implémente des **modèles sociaux, technologiques et de conception durables**


- en intégrant des **comportements moins gourmands en énergie**,
- à travers la **co-crédation d'interventions** sur l'environnement physique, et
- en rapport avec les **activités quotidiennes, le travail et les loisirs**.

FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE: STRATÉGIE



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ENVIRONMENTAL RESEARCH LETTERS



OPEN ACCESS


PERSPECTIVE

We have to talk about overconsumption (in three different ways)

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Keywords: inequality, planetary boundaries, wellbeing, sufficiency, consumption corridors, decent living standards

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1. Introduction

The idea that all people should be able to access a minimum level of goods and services—food, water, shelter, energy, healthcare, etc.—is an uncontroversial concept, both in academic and public discourse. This is the foundation of the United Nations Sustainable Development Goals and major climate change scenarios such as those from the International Energy Agency. It has also become widely accepted that reducing anthropogenic environmental impacts to sustainable levels will require demand-side changes to consumption, not just technological changes to production. The notion of minimum acceptable levels of consumption ('floors'), together with constraints on the total amount of economic activity permissible before environmental limits are exceeded, implies there are also upper limits to consumption ('ceilings').

Nonetheless, overconsumption remains a controversial topic in public discourse, and its definition remains hazy. Below we thus develop three definitions relevant to different scales—individual, social, and planetary. These can be used to form overlapping corridors beyond which consumption can be defined as useless, unfair, and/or unsustainable, each of which justifies different political responses. While these definitions emerge from different literatures—not all of which are concerned with environmental sustainability—we describe how all can (and should) be integrated and related to environmental limits. We then discuss the implications for understanding and modelling sustainability transitions.

2. Individually useless overconsumption


One way of defining overconsumption draws upon quantitative studies of individual wellbeing. Much research has been undertaken into how wellbeing changes with income, GDP, energy consumption,

and various environmental impacts. The key message of the literature is that returns to wellbeing from increases in these factors become increasingly marginal (Vogel *et al.* 2021, Galbraith *et al.* 2024). This suggests it is reasonable to define a saturation point beyond which increases in one's income, energy consumption, or other environmental impacts brings negligible wellbeing benefits (figure 1).

It should be noted that there are many ways to both conceptualise and measure wellbeing, and saturation points vary significantly with different indicators (O'Neill *et al.* 2018, Vogel *et al.* 2021). A key distinction is between objective and subjective wellbeing indicators. Objective indicators, typically underpinned by human needs (Gough 2015), include binary measures of whether a particular need is met (e.g. access to education or safe sanitation), which fully saturate once achieved, and continuous measures (e.g. healthy life expectancy or Human Development Index) that follow saturation curves (Vogel *et al.* 2021). Subjective indicators (e.g. life satisfaction or happiness) arguably saturate as well, but generally at higher levels of income and resource use (Fanning and O'Neill 2019). The picture for subjective indicators is further complicated by the zero-sum impacts of relative income, and by evidence that many small-scale societies—despite their negligible levels of consumption—achieve higher life satisfaction than most modern industrial nations (Galbraith *et al.* 2024).


Given all this, determining the exact location of saturation points is highly difficult; difficulties that are amplified for environmental impacts, as saturation points depend upon how intensively the conditions supporting human wellbeing are provided, and hence have reduced over time due to technological development (Steinberger and Roberts 2010). Moreover, one must define precisely what saturation means. Income-subjective wellbeing curves may not flatten completely at any income level (Killingsworth




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Joel Millward-Hopkins ¹, **Vivien Fisch-Romito** ¹, **Sascha Nick** ² & **Emile Chevreil**³

The idea that human needs should be secured for all people is largely uncontroversial, and recent research demonstrates that decent living standards could be secured for all, globally, with far lower energy and resource use than today. However, how the energy requirements of decent living vary across populations is poorly understood—particularly in high-income countries—and important questions regarding inequality remain unexplored. Here we show how, with a fairer distribution of energy, Switzerland could dramatically reduce energy consumption while securing wellbeing for all. We advance previous work on energy and wellbeing by decomposing an established net-zero scenario into the energy required to support human needs, and that related to affluence or excess. We estimate decent living energy in 2050 at 19.5 gigajoules per capita (18–26 gigajoules in varying subnational contexts), making it only -13% of Switzerland's 2019 energy footprint, and -23% of that projected in the net-zero scenario. This highlights the theoretical potential for affluent countries to move towards a more just, egalitarian global distribution of energy and resource consumption, while securing wellbeing for their own citizens.

The question of how human wellbeing can be secured with a minimum amount of energy use is receiving a growing amount of attention. Building upon the concept of Decent Living Standards¹, researchers have estimated that the material prerequisites needed to secure human wellbeing could be provided with only -10–30 gigajoules (GJ) per capita per year of final energy^{2–4}—a fraction of current global final energy consumption^{5,6}. Other research suggests these same living standards could be met universally without breaching planetary boundaries⁷ and with reduced global material consumption⁸. These findings are made more dramatic by considering that the majority of the world's population currently fall short of multiple aspects of decent living, most commonly mobility, cooling, and sanitation⁹.


These studies, along with closely related work developing Low Energy Demand scenarios^{10,11}, offer encouraging news. During the past decade, global carbon emissions and anthropogenic warming rates reached unprecedented levels¹², despite 30 years of climate change talks attended by political leaders. Current levels of global emissions may exhaust a 1.5°C budget in just a few years (dubt). Furthermore, many scenarios keeping warming to safe levels rely upon potentially unrealistic and infeasible technological deployment, most notably a grand scale of carbon capture¹³, which presents issues for both biodiversity¹⁴ and equity¹⁵. Futures in which energy demand can be substantially reduced—without harming wellbeing outcomes in affluent countries (particularly the World Bank High-Income countries and many of their Upper-middle income countries) and improving them in poorer regions—thus offer ways forward that mitigate the transition risk of technologically-demanding mainstream scenarios¹⁶. Such demand reduction is also appealing from a national perspective, as it makes energy security (or even self-sufficiency) much easier to achieve.

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RESEARCH ARTICLE

The effects of teleworking on CO₂ emissions from commuting: baselining key data to investigate transformative change in living labs

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The quantitative monitoring of the greenhouse gas (GHG) mitigation potential of interventions is central to a living-lab approach and is a methodological challenge. Valid population data on consumption patterns and mobility behaviour are often scarce, especially when the living lab is initially set up (for example, the need for baseline data before an intervention). In the context of transportation studies, a cross-sectional survey was carried out to baseline key data on GHG emissions generated by commuting before implementing an intervention. Based on this information, the GHG emissions from commuting were calculated and analysed using a linear regression model. Results show the effects of different variables, such as the share of teleworking within a working week, the regular workplace location, and attitudes towards individual mobility and former relocation behaviour. An increase in teleworking of 10 per cent based on weekly working time leads to a reduction of approximately 60 kg of GHG (8 per cent) emissions a year. Our results serve as baseline key data to analyse upcoming (temporary) interventions (for example, new coworking spaces within our living lab). Hints for rebound effects, limitations of our study and future interventions are discussed.

Keywords living labs • teleworking • commuting • CO₂ emissions • rebound effects


Key messages

- Data to assess the effectiveness of interventions in living lab studies is scarce when a living lab is set up.
- Teleworking in a living lab can be seen as an intervention. Based on the key data generated, this intervention can be evaluated.
- Multivariate linear regression reveals that an increase in teleworking of 10 per cent leads to a reduction of 60 kg of CO₂ emissions a year.



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Systems perspectives on transforming Swiss housing by 2040: wellbeing, shared spaces, sufficiency, and de-sprawl

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The Swiss habitat—buildings and related mobility—faces multiple interconnected problems which can only be solved together. These include high energy consumption, significant climate impact, excessive material use with low circularity, accelerating urban sprawl and ecosystem destruction, high mobility costs, low inclusion, and mixed wellbeing outcomes. Guided by values of wellbeing for all within planetary boundaries, we propose a normative scenario based on a nationwide moratorium on new construction until 2100, coupled with four simultaneous neighborhood-scale interventions: renovating buildings to achieve energy class A with high indoor environmental quality, creating flexible shared living spaces, ensuring essential daily services are available within each neighborhood, and deconstructing unneeded settlements. Action levers, coordinated efforts on multiple system leverage points, are here combined with rethinking needs satisfaction. Our model predicts that full renovation could be accomplished in 14–18 years, significantly reducing labor, energy, materials, and costs both during and after the transition. Furthermore, it could reverse urban sprawl to levels seen in 1935 or even 1885, depending on deconstruction choices. These findings suggest that demand-side policies could be implemented with low risk, enhancing wellbeing, energy resilience, biodiversity, and climate action, thus providing a strong foundation for societal dialog and experimentation.

KEYWORDS
systems thinking, wellbeing, sufficiency, demand-side solutions, low energy demand, reversing urban sprawl, shared spaces, new building moratorium

1 Introduction

The Swiss human habitat, consisting of buildings open spaces between buildings, and daily mobility induced by the position of buildings, is linked to a wide range of problematic outcomes, making it much harder to reach the goal of wellbeing for all within planetary boundaries. Habitat-related issues encompass several critical areas. Energy use and associated GHG emissions remain significant concerns (EUE, 2023; BAUE, 2023a). Material use is high, with a low circularity rate of just 6.9% (Circle Economy, 2023). Urban sprawl has been accelerating since 2002, contributing to ecological habitat degradation (Schwick *et al.*, 2018). High mobility use leads to various costs, including accidents (resulting in 15,200 lost life-years in 2020), air pollution, noise, and travel time (EUE, 2023). Additionally, housing-related capital accumulation is unequal, which exacerbates inequality in housing and life outcomes (Bosmet *et al.*, 2014). Wellbeing outcomes are mixed, as reflected in the housing indicators of the OECD Better Life Index (Van Zanden *et al.*, 2020). Similar outcomes are observed in other rich countries.

Frontiers in Sustainability

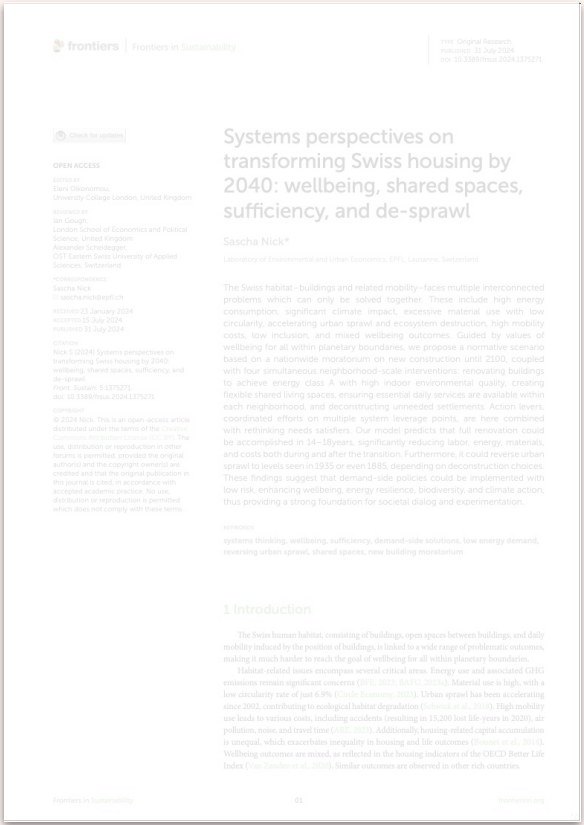
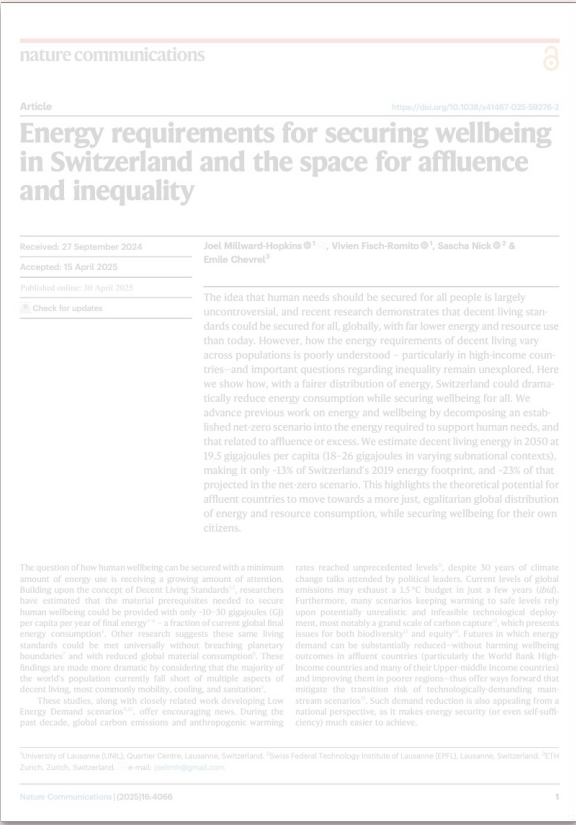
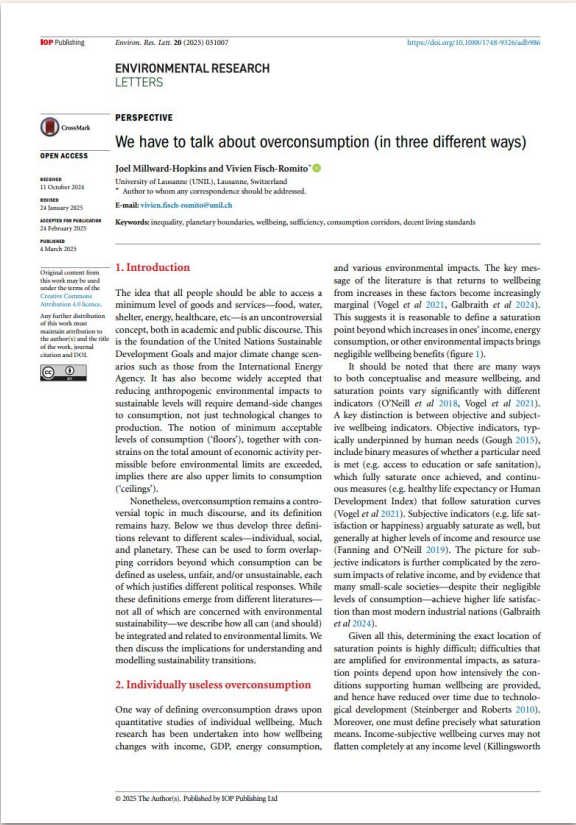
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sweet swiss energy research
for the energy transition

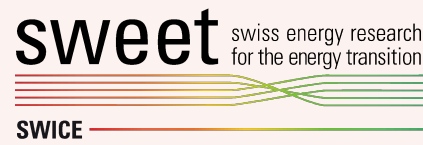
SWICE

FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE: STRATÉGIE

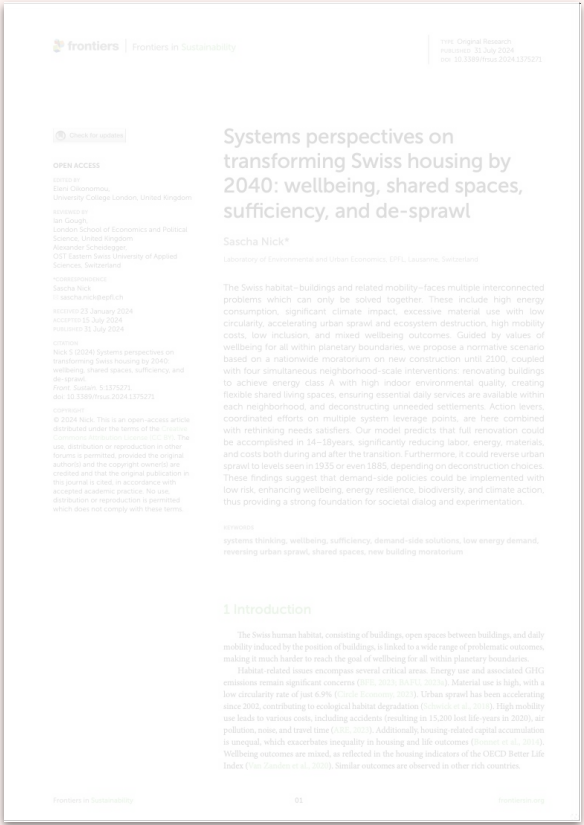
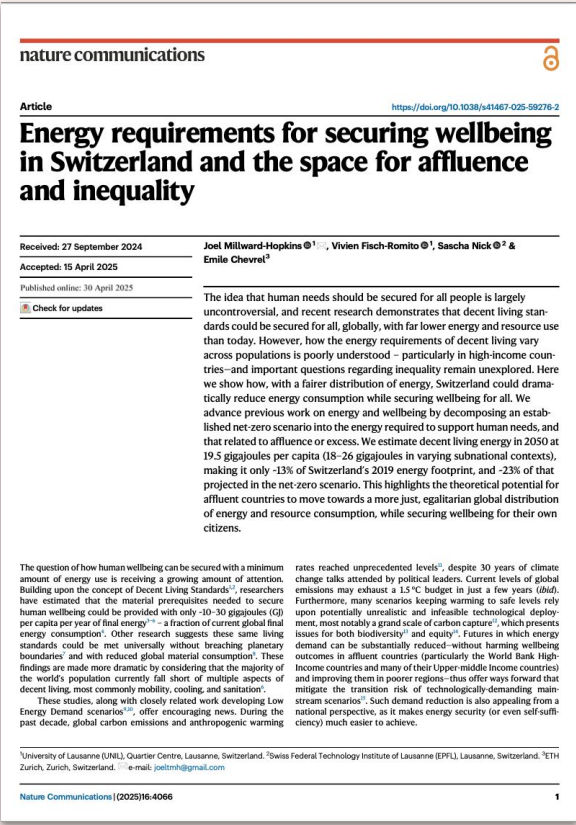


Les politiques climatiques doivent s'attaquer directement à la surconsommation en fixant des limites à l'usage des ressources, en promouvant l'équité et en soutenant des voies alternatives de bien-être

Millward-Hopkins & Fisch-Romito - 2025

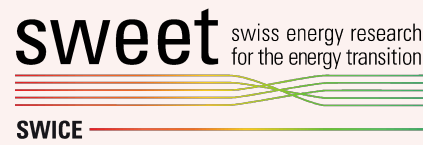


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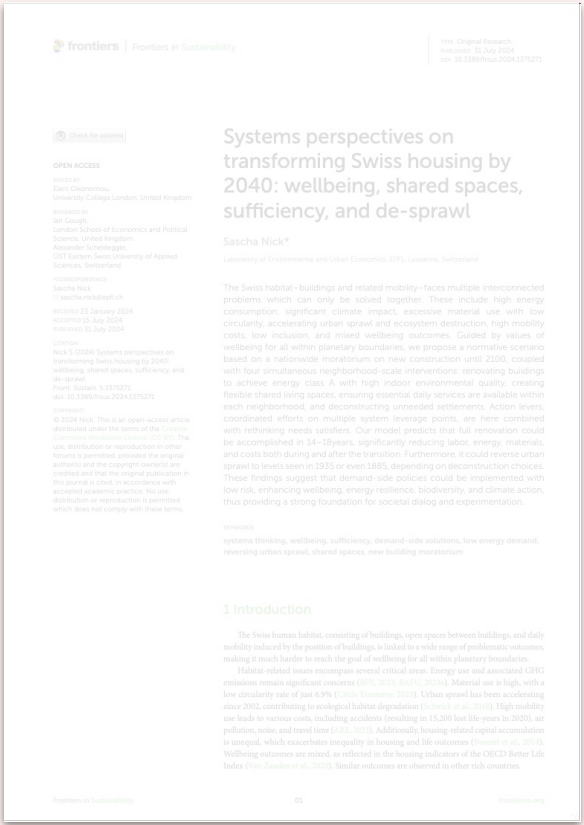
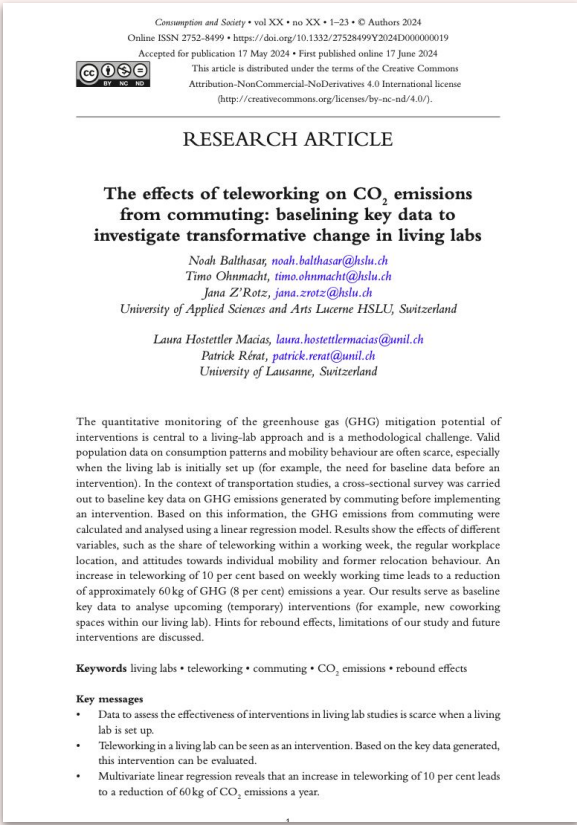
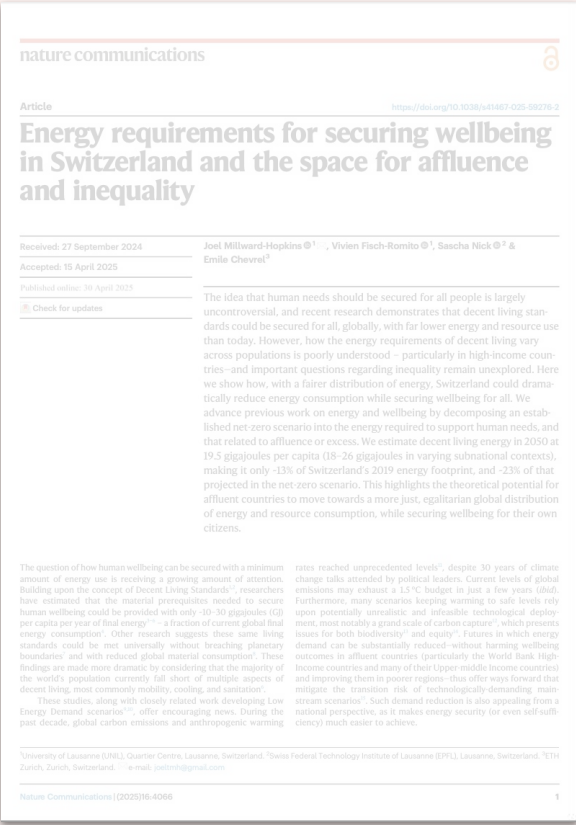


Identifie le **minimum d'énergie** nécessaire pour garantir le **bien-être en Suisse**, aidant ainsi les décideurs à **équilibrer sobriété, efficacité et équité** dans la définition des politiques énergétiques et de logement

Millward-Hopkins, Fisch-Romito, Nick, Chevrel - 2025

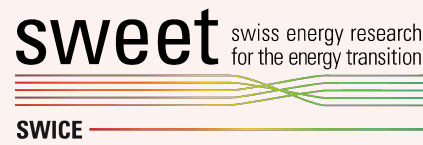


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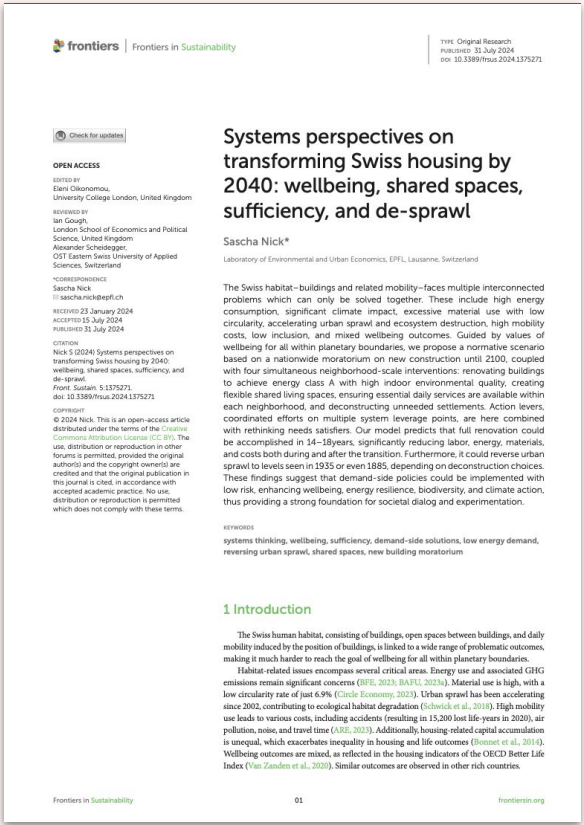
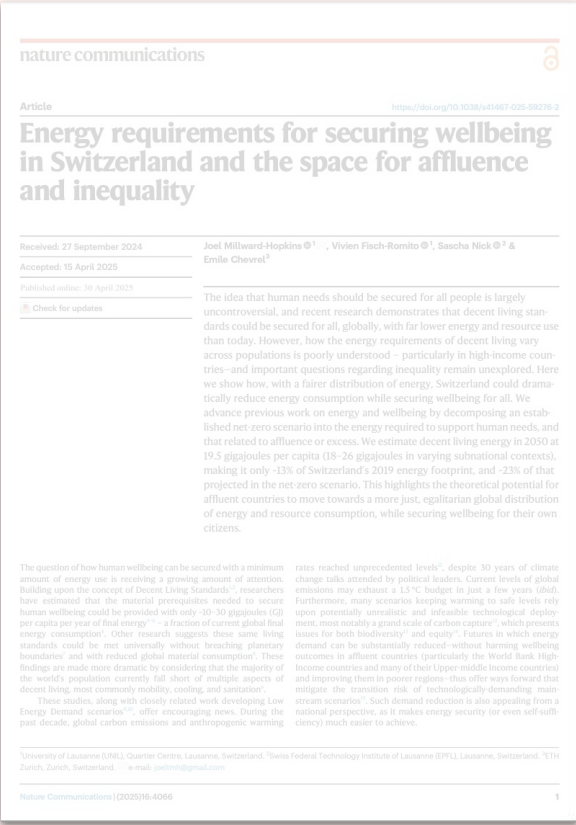


Le télétravail et le co-working peuvent réduire de manière significative les émissions liées aux trajets domicile-travail, fournissant ainsi une base pour des politiques de mobilité et de climat qui encouragent des modalités de travail flexibles

Balthasar, Ohnmacht, Z'Rotz - 2024

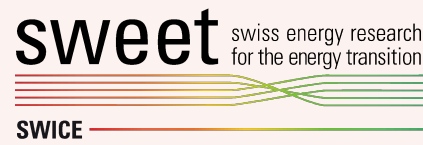


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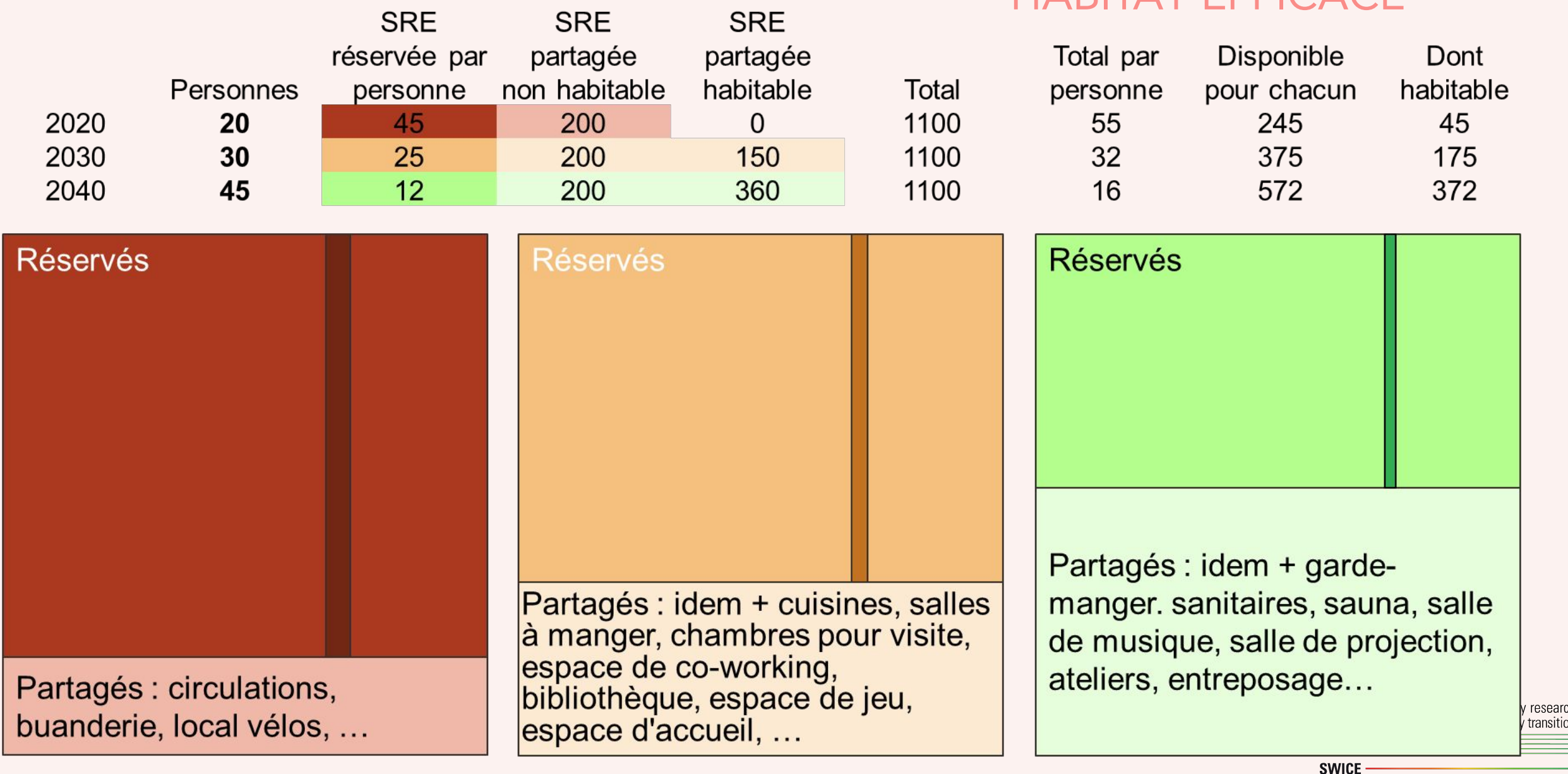
Des **mesures de sobriété** (espaces partagés, conception axée sur le bien-être et limitation de l'étalement urbain) peuvent **orienter les politiques de logement** à long terme vers des résultats climatiquement neutres et socialement inclusifs

Nick - 2024



FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE:

RÉFÉRENCE POUR HABITAT EFFICACE



FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE: INTERVENTIONS

Smart Living Lab, Fribourg

*Énergie des bâtiments, gestion
des sources d'énergie,
composants de construction,
aménagement urbain*



Pavillon STEP

Lokstadt, Winterthur

*Modes de vie durables,
mobilités douces et
utilisation raisonnée de l'
énergie*



Station cargo-vélo

Suurstoffi, Risch-Rotkreuz

*Nouvelles formes de travail
(co-working, télétravail) et leur
influence sur l'énergie et la
mobilité*



Tests d'espaces de coworking

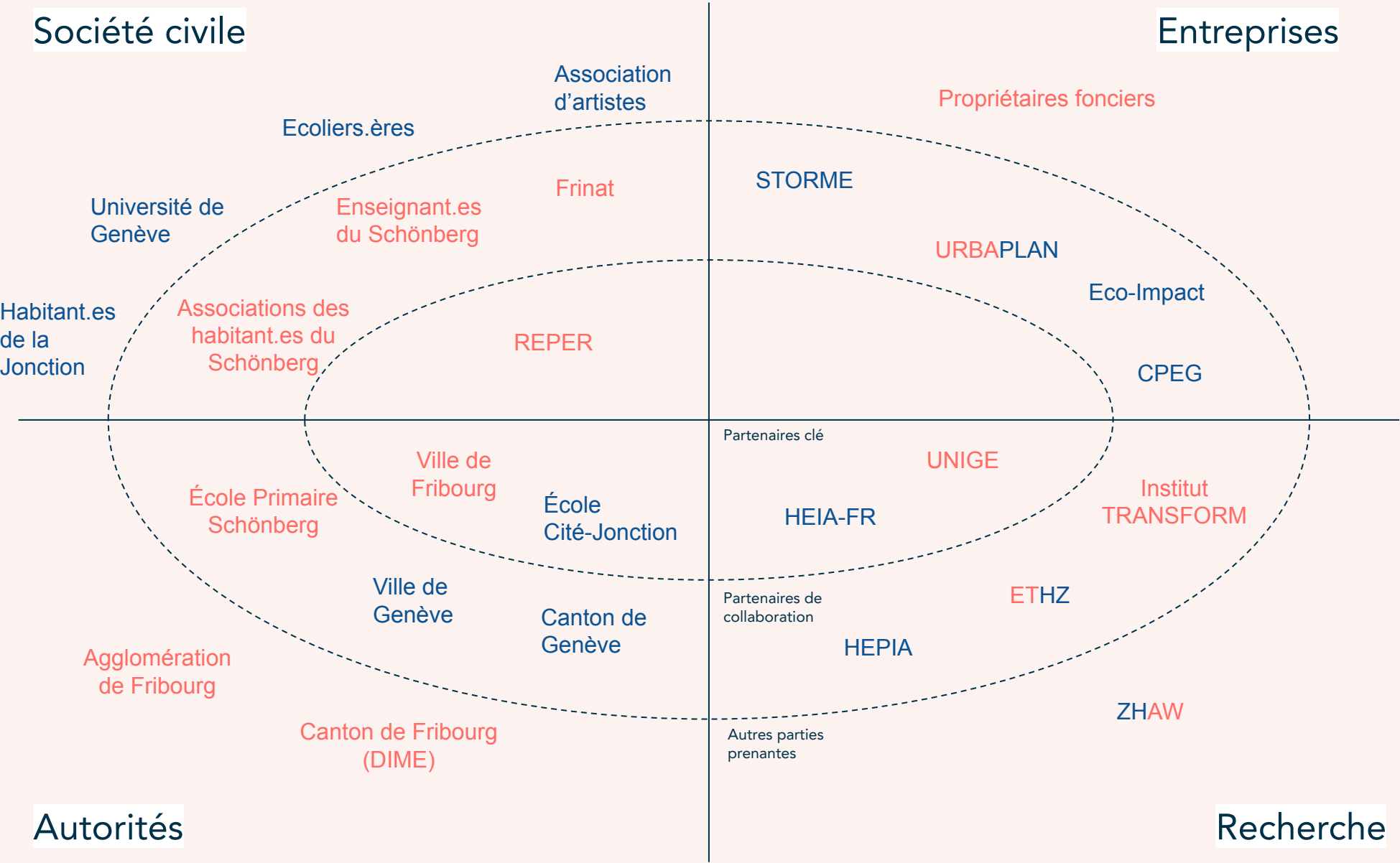
Schoenberg, Fribourg + Jonction, Genève

*Espaces extérieurs, confort
thermique, installations
urbaines temporaires sans
consommation d'énergie*

Eglantine, Morges

*Gouvernance de quartier pour la
réduction des émissions,
l'adaptation au changement
climatique et la mobilité durable*

OPEN SPACES LIVING LABS



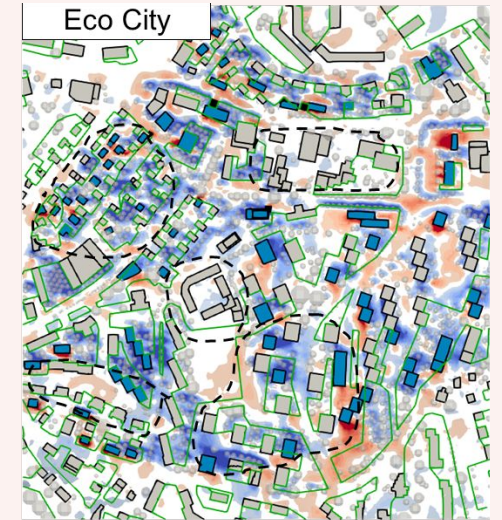
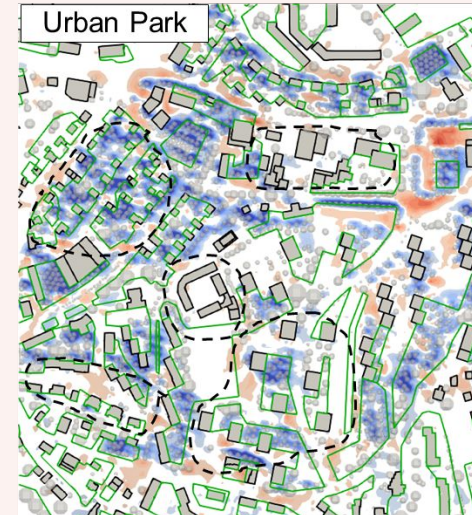
Jonction
(Genève)



Schönberg
(Fribourg)

FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE:

INTERVENTIONS

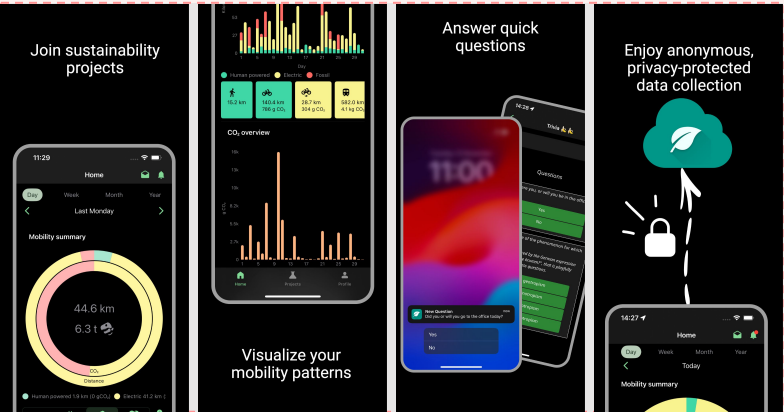


Des **enseignements pertinents** - et parfois contre-intuitifs - issus de la recherche qui suscitent une **évolution des pratiques professionnelles**, et qui sont **partagés dans les revues spécialisées** en plus des journaux académiques

WP 5 - Living lab "Schönberg" à Fribourg

FAITS SAILLANTS DE LA 3E ANNÉE DE SWICE: Outils de Décision

Application SWICE



Application de mesure des comportements individuels durables de mobilité, de l'activité physique, de l'utilisation d'énergie, etc.

Jeu sérieux PowerHood



Simulateur de conflit et de négociation pour des scénarios en lien avec la transition énergétique et le bien-être dans les communes suisses

Cartes Persona pour une segmentation douce

Eco-Friendly Nikki

Nikki is extremely environmentally friendly. This is her environmentally friendly means of transport, avoiding belts. Nikki values privacy and prefers things to be simple.

What you can do - Choose:

- Buy and sell items and Decide on a day of the regional produce.
- Only heat room
- Find out about electricity prod
- Advocate Use the r
- Env
- If p

Budget-Conscious Kim

Kim is very self-determined, attaches great importance to consumption behaviour by rules or prohibitions. Moreover save energy and use food economically, but also in a li

What you can do - Choose:

- Browse for unique items
- Buy reduced food that is for tasty offers in your n
- Only run the wash money.
- Check the correct optimal quality of
- Take advan
- Use the r
- Replace yo
- fees.
- Bring
- Exch
- hack
- Ch

Comfort-Oriented Gaby

Gaby is a bon vivant, appreciates the tried and teste subordinate role and Gaby doubts that one's own ac by car, rejects restrictive regulations in favour of the our.

What you can do - Choose:

- Invest in a pressure co
- Buy seasonal and regi
- Fill the dishwas
- Descal your ke
- electricity in the
- Avoid tra
- instead.
- Replace c
- without s
- SW
- sta

Modest Billie

Billie is frugal and attaches little importance to s food, but is rather reluctant to do without anima is rather moderate. When it comes to new exper much and if so, only rarely by public transport.

What you can do - Choo:

- Introduce a vegeta
- specialties.
- Visit the local mar
- Pay attentio
- Set...Eco mo
- Disco
- Use pi
- Ch

Focused Francis

Francis likes to try new things, is constantly looki seen in the conscious purchase and handling of fi and in pronounced energy-saving efforts in the h mentally conscious way. Francis regularly trav

What you can do - Choo:

- Set a challenge and successful?
- If you need a new de
- Switch off the when you go
- Borrow and le
- them.
- Leave from, fr
- Make a mily an
- Ch

Techie Tony

Tony is socially well-connected, loves trying out new things and has a keen interest in technological innovations. Further, Tony is very involved in society, for example by taking part in activities for the environment. Efforts to save energy or avoid animal products are rather moderate. Tony is a frequent traveller and often uses public transport, but also travels by car or plane.

What you can do - Choose suitable tips

- Discover other cultures through their vegetarian cuisine and and invite your friends or family over for a meal.
- Buy second-hand clothes and items online.
- Check your shower temperature and duration with a smart measuring device (e.g. Amphiro shower head).
- Optimise your home with smart devices (e.g. warm water tracking, timers, smart meters, etc.) and buy energy-efficient household appliances.
- Use the night train connections for your trips to European cities.
- Resolve to use your bike for shopping for a month and announce it to your friends and family.
- Use your work laptop for as long as possible before purchasing a new one.
- Go looking for a good veggie lunch at your place of work.

Identification de modes de vie représentatifs en lien avec la durabilité et leur prévalence, permettant de proposer des interventions sur mesure

PowerHood Serious Game

Qu'est-ce que PowerHood ?

PowerHood est un jeu de plateau basé sur les rôles et la négociation, conçu pour les quartiers urbains suisses

Qu'apporte PowerHood ?

- ✓ Simulation de compromis et planification future
- ✓ Valorisation des voix marginalisées
- ✓ Réduction des écarts de connaissances et de pouvoir
- ✓ Promotion de l'apprentissage et de la collaboration



SWICE

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