

ENV 501 / GR A3 30

Material Flow Analysis and resource management

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- Current** **Full Professor for Human-Environment Relations in Urban Systems (HERUS)**, EPFL, since March 2016
Dean School of Architecture, Civil & Environmental Engineering (ENAC), EPFL, 2020-2023
- Positions held** **Assistant Professor for Social and Industrial Ecology**, Institute for Geography, University of Zurich, 2006-2009
Full Professor for Systems Sciences, University of Graz, Austria, 2009-2011
Full Professor for Human-Environment Relations, Department of Geography, University of Munich, 2011-2016
- Habilitation** **ETHZ Venia legendi Human-Environment Systems, 2006**
Concept and models on material stocks and flows in human-environment systems:
A contribution to transitions towards sustainable development
- Post-doc** **University of Maryland, USA**
Ecological Economics / Agricultural and resource economics
- PhD** **ETH Zürich, 1996**
The early recognition of environmental impacts of human activities in developing countries

Dr. Francisco Xavier Félix Martín del Campo



- Current** **Postdoctoral Researcher, Laboratory on Human-Environment Relations in Urban Systems (HERUS), EPFL, since October 2023**
Socio-metabolic research
Material flows & stocks analysis
Built environment
Circular economy
- PhD** **“Sustainability Management”, University of Waterloo, Canada, School of Environment, Enterprise and Development (SEED), Industrial Ecology Group, 2018 – 2023**
Resource-use dynamics
Socio-metabolic risks
Sustainability & resilience to climate change
- Private sector** **Construction & engineering sector**
Corporate Social Responsibility / resources optimization
Renewable energy / energy savings
Energy management system for the construction sector



- Current** **PhD student, Laboratory on Human-Environment Relations in Urban Systems (HERUS)**
Governance of energy transitions
- Research project** **Enabling Decentralized renewable Generation in the Swiss cities, midlands, and the Alps (EDGE)**
Socio-technical transition pathways
- Master** **Eindhoven University of Technology, 2022**
Sustainable Energy Technology
Maastricht University & UNU MERIT, 2022
Public Policy & Human Development



Current **PhD student, Laboratory on Human-Environment Relations in Urban Systems (HERUS)**
Simulation of energy transitions

Research **Analyzing tipping points in the adoption of low-carbon technologies**
Socio-technical transition pathways

Master **EPFL, 2024**
Computational science and engineering



HERUS

Urbanization: Opportunity and challenge

Although urban areas only cover 3% of the Earth's surface, they...

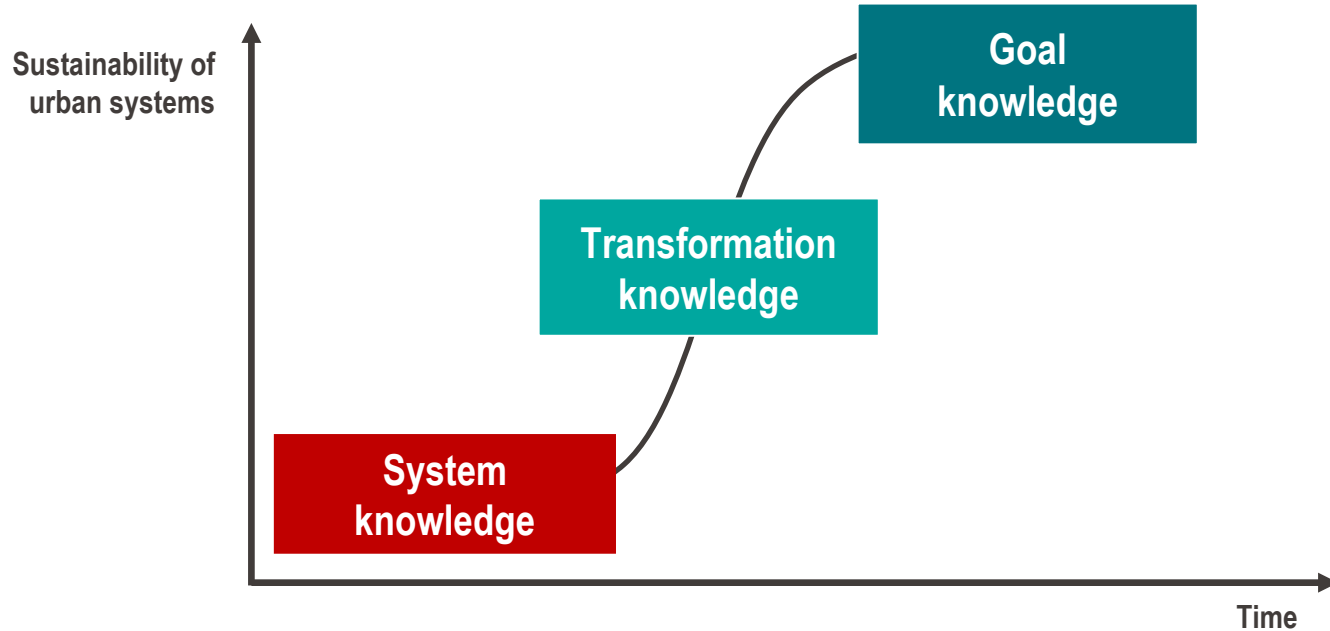
house more than
50%
of the global population

generate more than
80%
of global economic activity

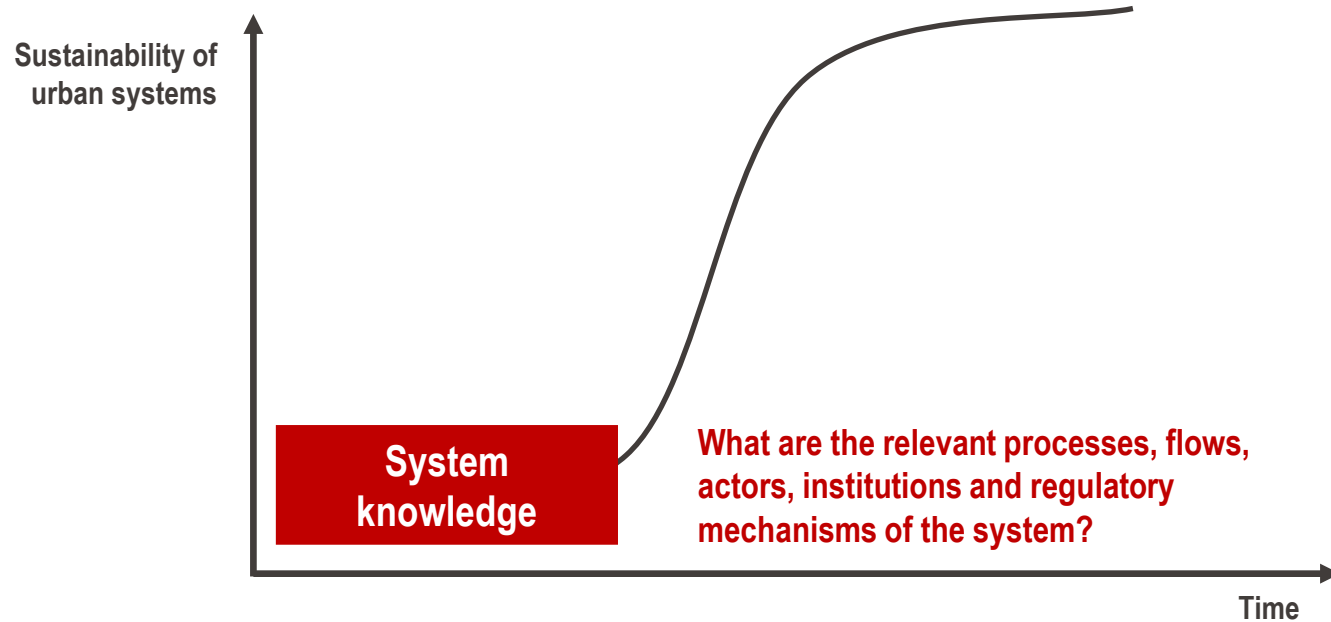
consume
75%
of global resources

produce
75%
of global emissions

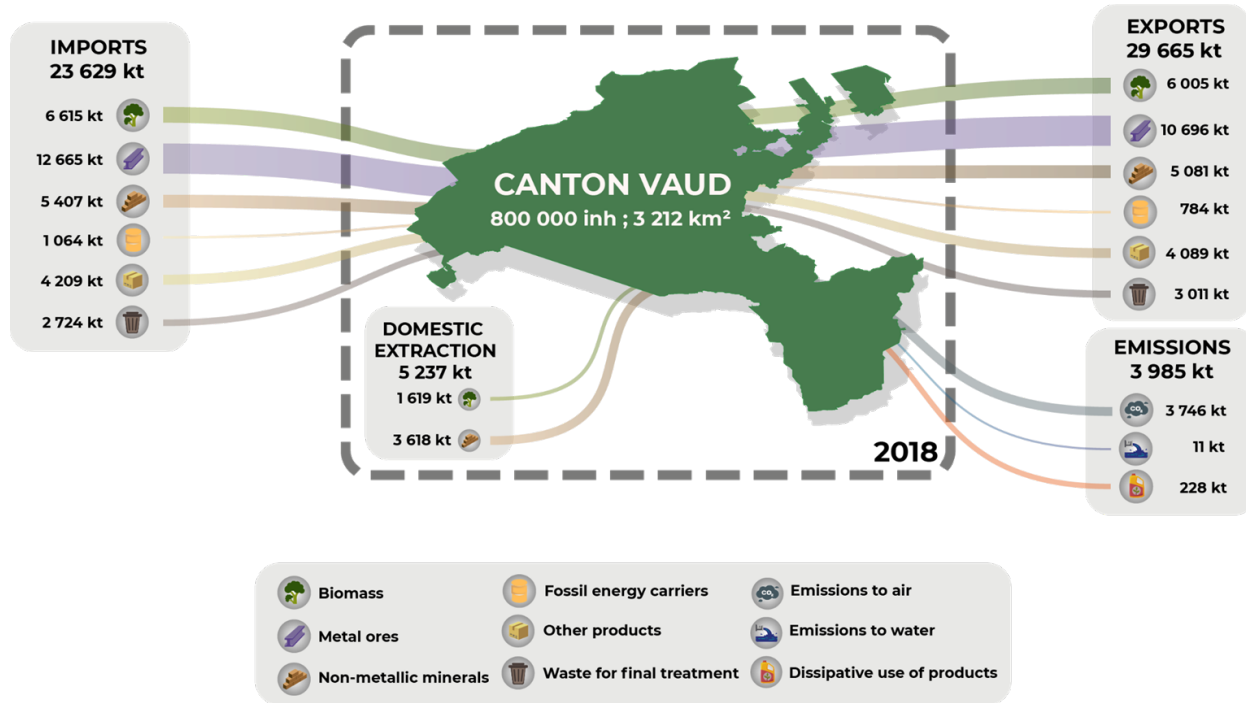
Vision: Transition of urban systems towards sustainability



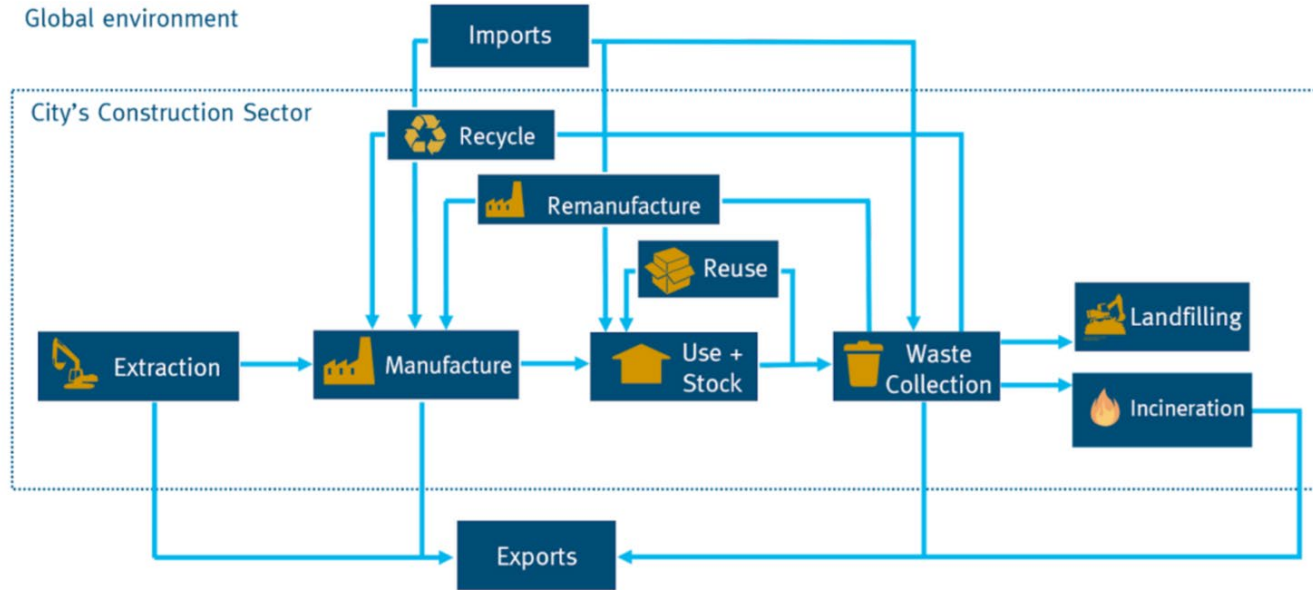
What questions do we address?



Overview of flows in territories



Human activities and networked urban systems



Flows, processes, actors and regulations

POLITIQUE & INSTITUTIONNEL

- Burden Sharing intra belge: 0,073 Mtep d'énergie provenant de sources renouvelables en région bruxelloise
- Objectifs européens de recyclage et d'ER: 65% des déchets municipaux recyclés en 2030 (Circular Economy Package de la CE)
- Discussions sur la biométhanisation à Bruxelles : tensions
- Choix top-down sur les infrastructures
- IBGE et ABP : ministres de tutelle différents
- Partenariats public-privé (PPP) complexes

→ SYSTÈME TOP-DOWN & TECHNOCRATIQUE

RÉGLEMENTAIRE

- Directives européennes très strictes qui freinent les innovations :
 - Règlement (CE) no 1069/2009 du parlement européen et du conseil du 21 octobre 2009
 - Règlement (UE) no 142/2011 de la commission du 25 février 2011
- Rubriques 41-1-1 et 41-2-B fixant les permis à demander selon les capacités de traitement de compostage.
- Arrêté royal du 28 janvier 2013 relatif à la mise sur le marché et à l'utilisation des engrais, des amendements du sol et des substrats de culture
- Marge de manœuvre et d'influence possible via BE et CoABP

→ SYSTÈME VERROUILLÉ

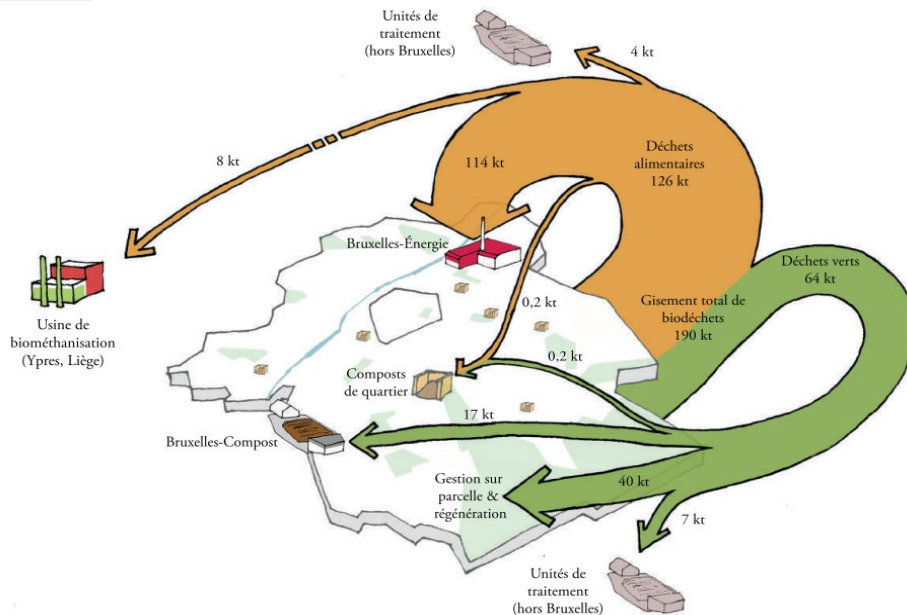
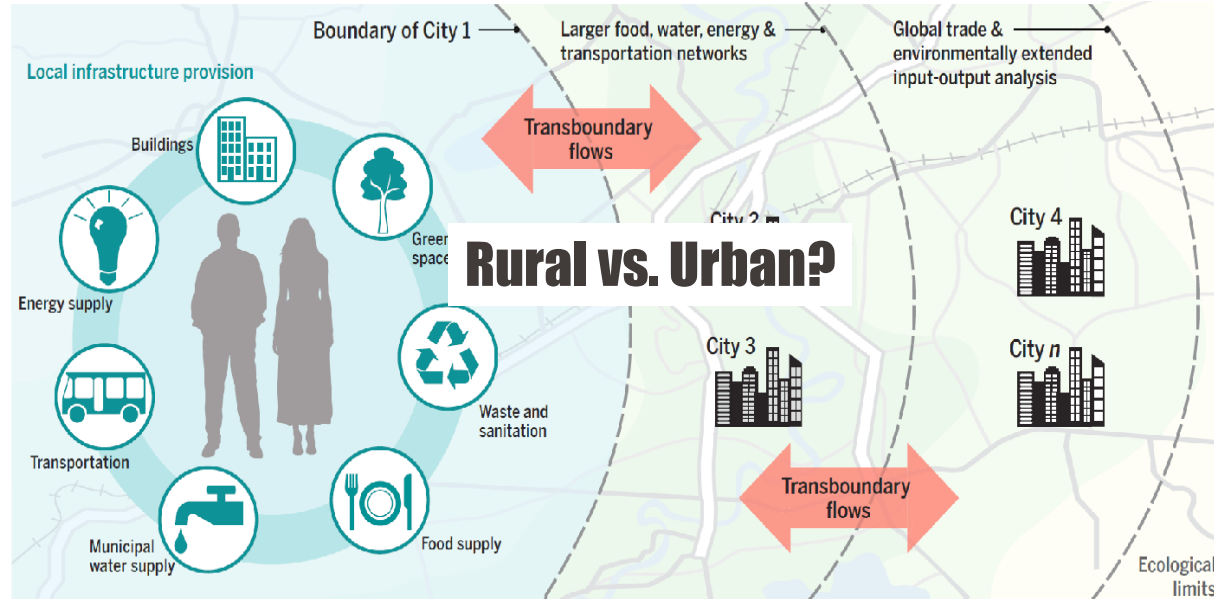


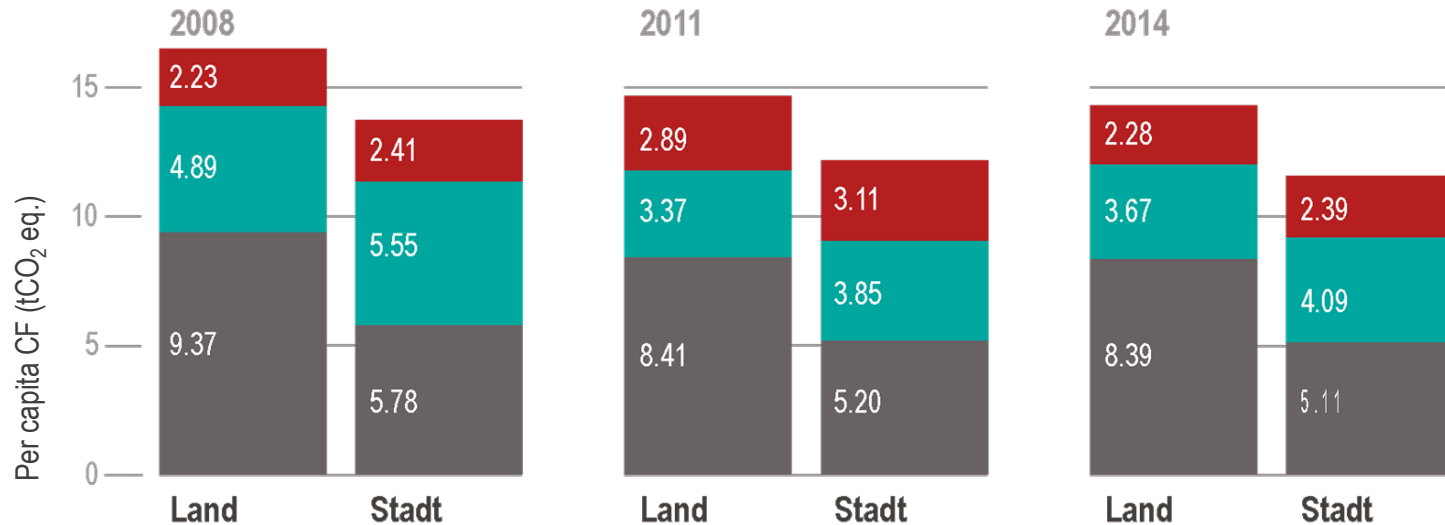
Schéma 3. Gisements, flux et infrastructures de traitement des biodéchets alimentaires et verts de la Région bruxelloise

Human activities and networked urban systems



Ramaswami et al., 2016

Rural and urban carbon footprint (tCO₂ eq/cap)

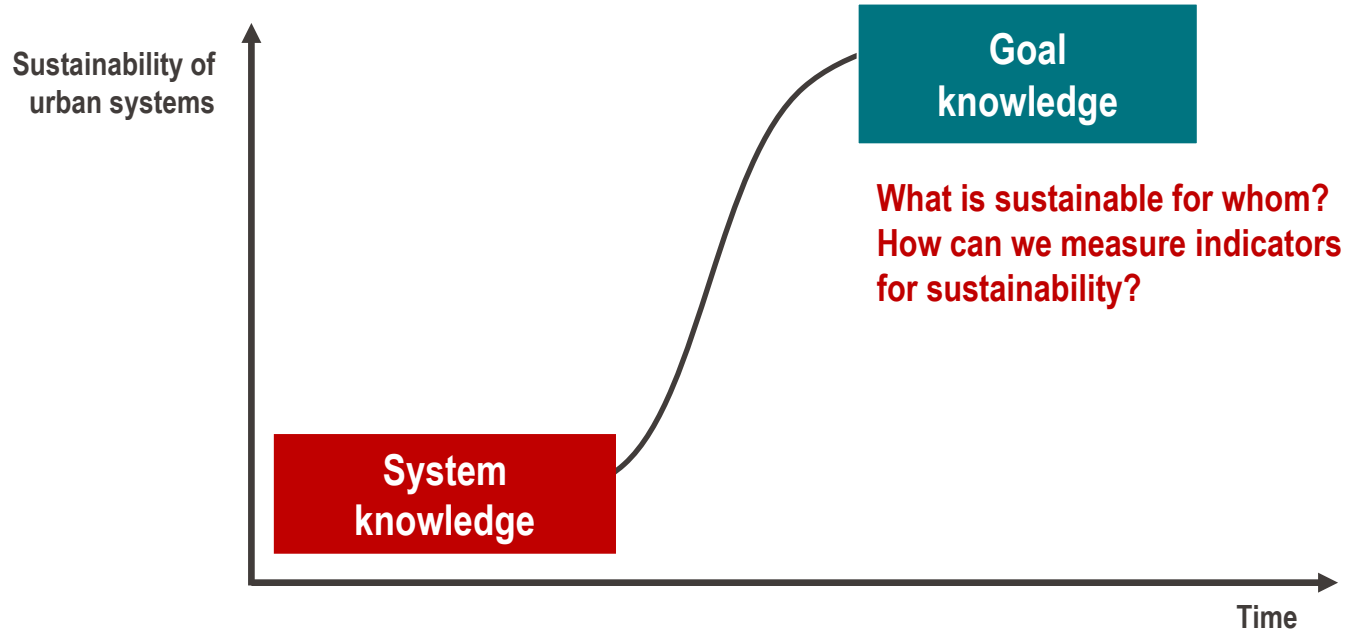


■ Indirect (imp.) ■ Indirect (dom.) ■ Direct

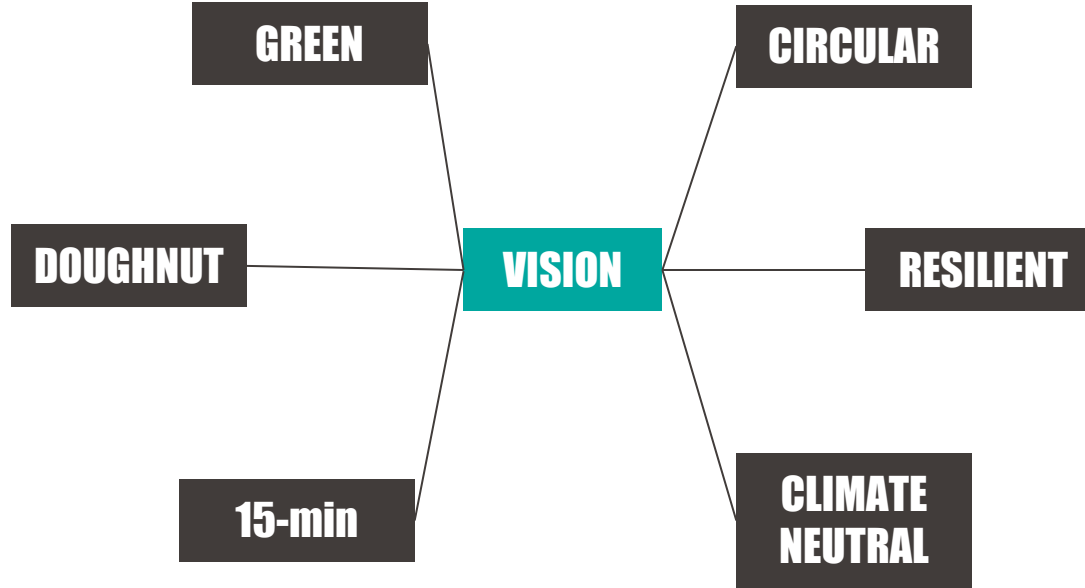
Direct: mobility und living (heating)

Indirect: consumption (e.g. clothes, food, travelling)

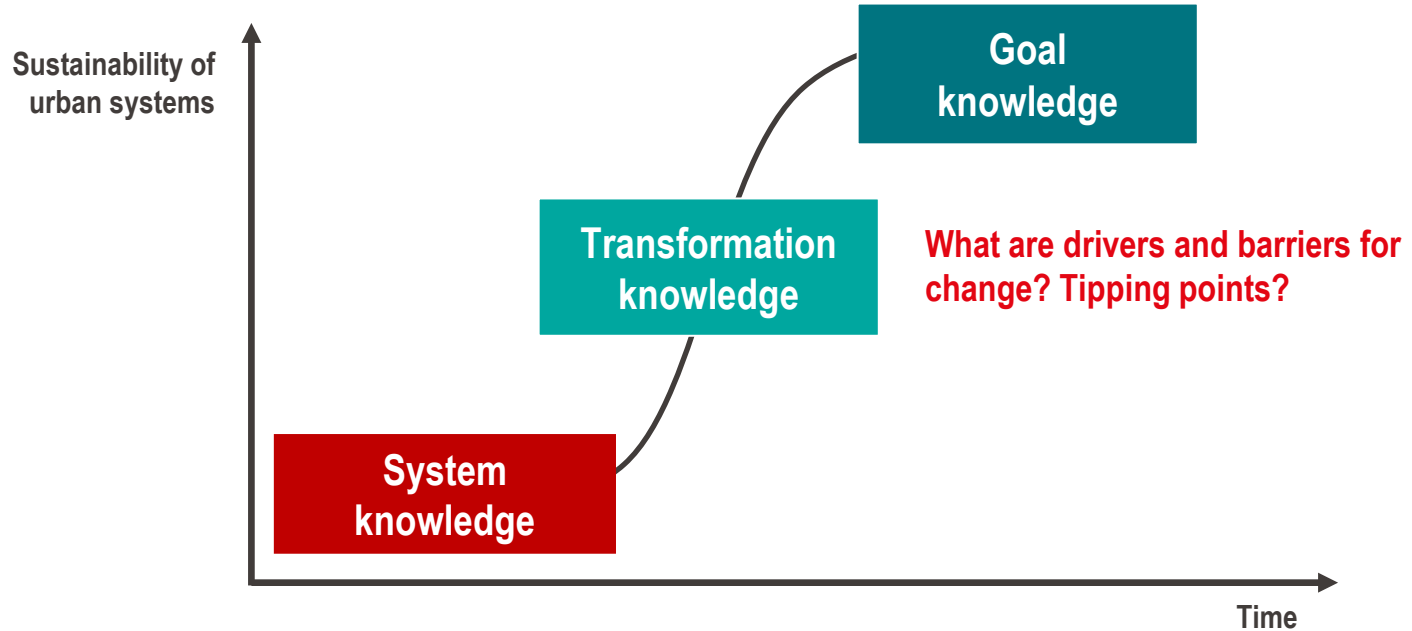
Vision: Transition of urban systems towards sustainability



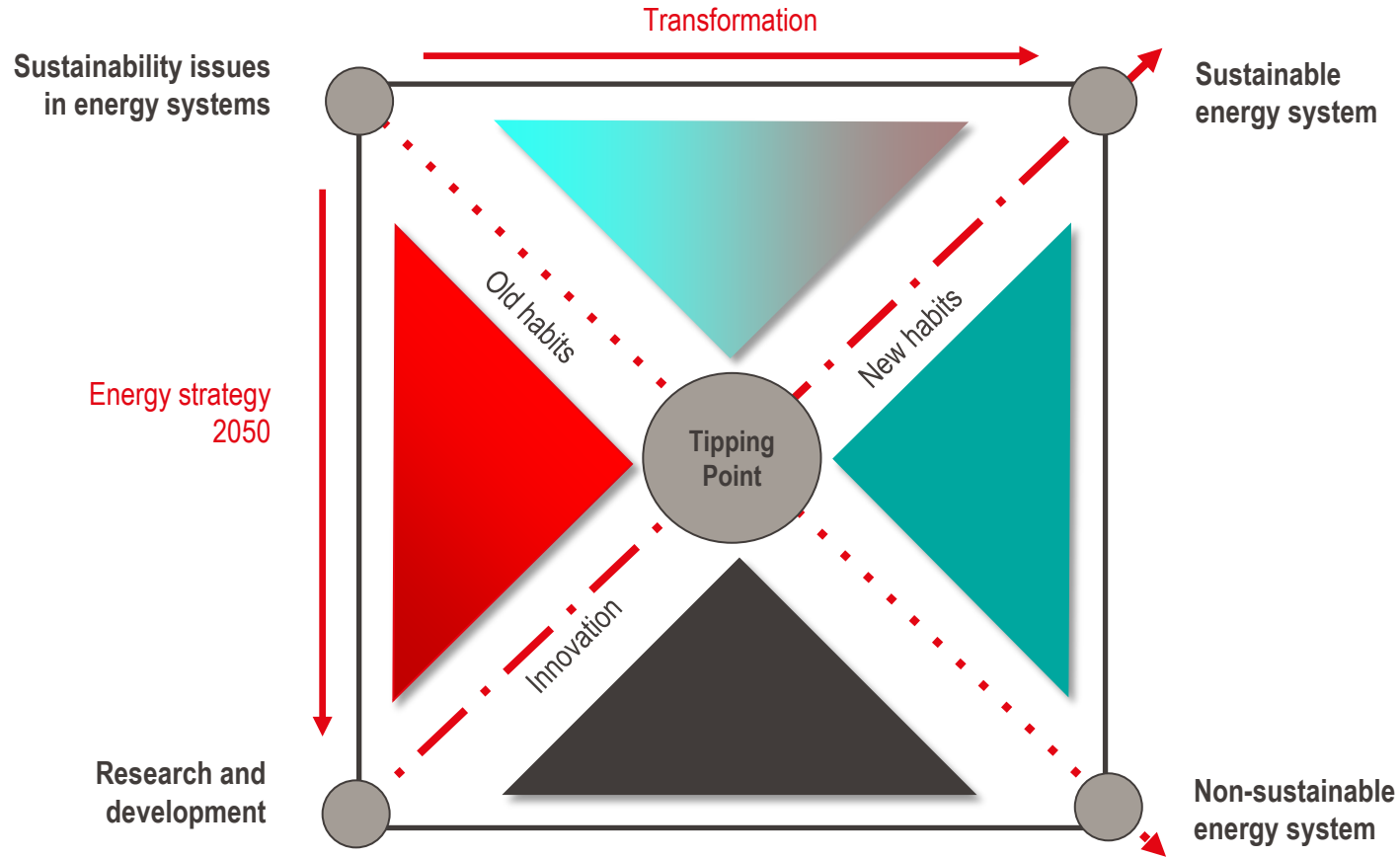
Different visions for cities



Vision: Transition of urban systems towards sustainability



Thinking of tipping points



Student projects

We are always seeking highly motivated and engaged students to work on **master's and semester projects**.



[HERUS Website](#)

Open student projects

[Material stock analysis of transport infrastructure in Switzerland.](#)

Type: Master's or semester project

Starting date: September 2025

Supervisors: Francisco Xavier Félix Martín del Campo, Claudia Binder

[Feasibility of Lausanne's building renovation targets: Construction materials and circularity potentials.](#)

Type: Master's or semester project

Starting date: September 2025

Supervisors: Francisco Xavier Félix Martín del Campo, Claudia Binder

[Are we approaching a Positive Tipping Point in the adoption of electric vehicles? Analyzing early opportunity signals for EV adoption](#)

Type: Master's or semester project

Starting date: September 2025

Supervisors: Léonard Lechot, Claudia Binder

[Simulating the energy transition of St. Prex](#)

Type: Master's or semester project

Starting date: September 2025

Supervisors: Jair Campfens, Claudia Binder

[Analyzing the Influence of Environmental Assessment Methods on Transition Policies in the Lake Geneva Region](#)

Type: Master's or semester project

Starting date: September 2025

Supervisors: Matthias Heinrich, Claudia Binder