Surveying the sustainable infrastructure landscape, normative approaches and initiatives:

Infrastructures From Risk Management and Ecosystem Retrofitters to Sustainability Accelerators

UNEMG- UN-ENVIRONMENT NEXUS DIALOGUE – GENEVA

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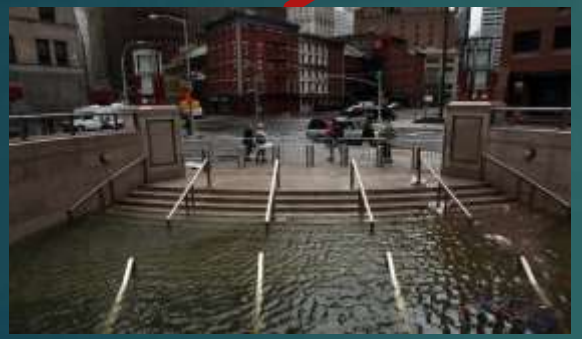
1- Global Context of Infrastructures development



2- In search of new tools to conceptualize best practices

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Cities are today's living laboratories that encourage shifts in urban development strategies and **put real-world challenges into context**

The tools, resources and networks a city has to offer tend to be greatly underutilized within the nexus and system logic

- While constructivist problem-based learning has increasingly become integrated on the ground with much success, there still remains a gap in policy formulation and strategic thinking :

How to go from problem identification

To the formulation and implementation of Impactful innovative and adaptive solutions

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable

SDG 6: Ensure availability and sustainable management of water and sanitation for all

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

SDG 13: Take urgent action to combat climate change and its impacts.

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Fundamental Questions :

- *What policy instruments/tools do policy makers have to ensure better (cross-sectoral) integration across governance frameworks? What lessons can be learnt from past experiences?*

- *How can these policies be Impactful? What are reliable indicators for progress in the area?*

3- Using infrastructures and infrasystems as frame of reference

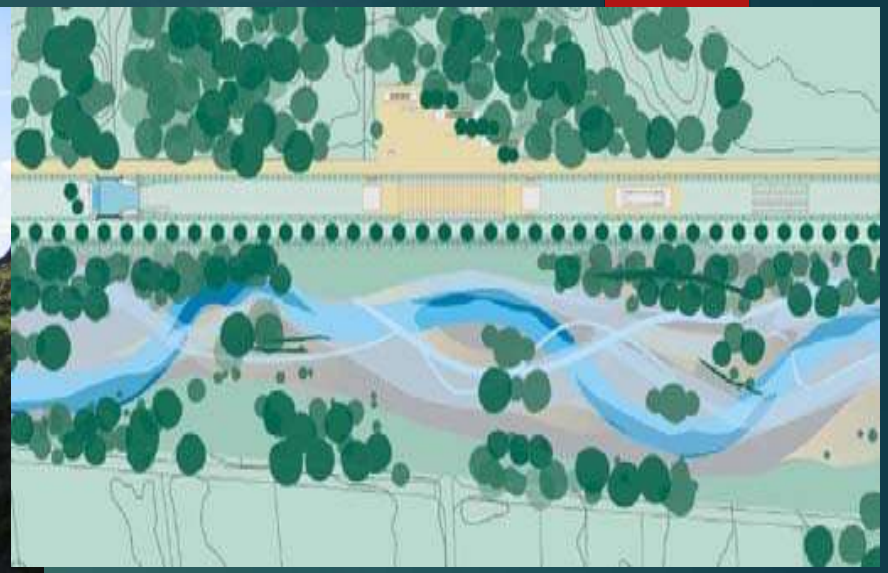
Case 1 : Value Creation through Green and DDR Infrastructure development in Geneva

Core Definitions

- From **Infrastructures**…
  - The basic physical and organizational structures and facilities (e.g. grid, water, transportation) needed for the operation of a society or enterprise.

- … to **Infrasystems**
  - Networks (nodes and links) of **material** and **social** elements to collectively participate in delivery of key services to the society in relation with their natural environment .
  - *Sociotechnical complexes* refers to a broad community of involved groups including the engineering community, scientists, policy-makers, users and interest groups, their cognitive routines and their alignment of activities, resulting in development along 'technological trajectories'

Re-Greening the river Aire in Geneva



Ecological engineering for management of urbanized systems => Biodiversity retrofitting , Climate change adaptation / permeability increase , public / leisure space development

Case 2 : Value Creation through energy and transportation infrastrcture integration : Geneva…and its airport

- Landlocked border city between two countries (France and Switzerland), defining a cross-country metropolitan area of 1mil.
- A city of 300,000 with the target of being 100% renewable energy-based by 2050.
- Historically very localized and distributed decision-making process.
- Home of a lot of IOs, one of the seats of global governance.

..rapid growth of air traffic

- Geneva Airport: 17.35 mil passengers (+4.8% YoY)
- 427 mil US$ revenue; 11,000 employees (1,000 direct).
- Extremely close to the city center and right on the border with France.

Controversial: friction with powerful and vocal citizen groups & municipalities around the airport in both Switzerland and France because of noise and pollution.

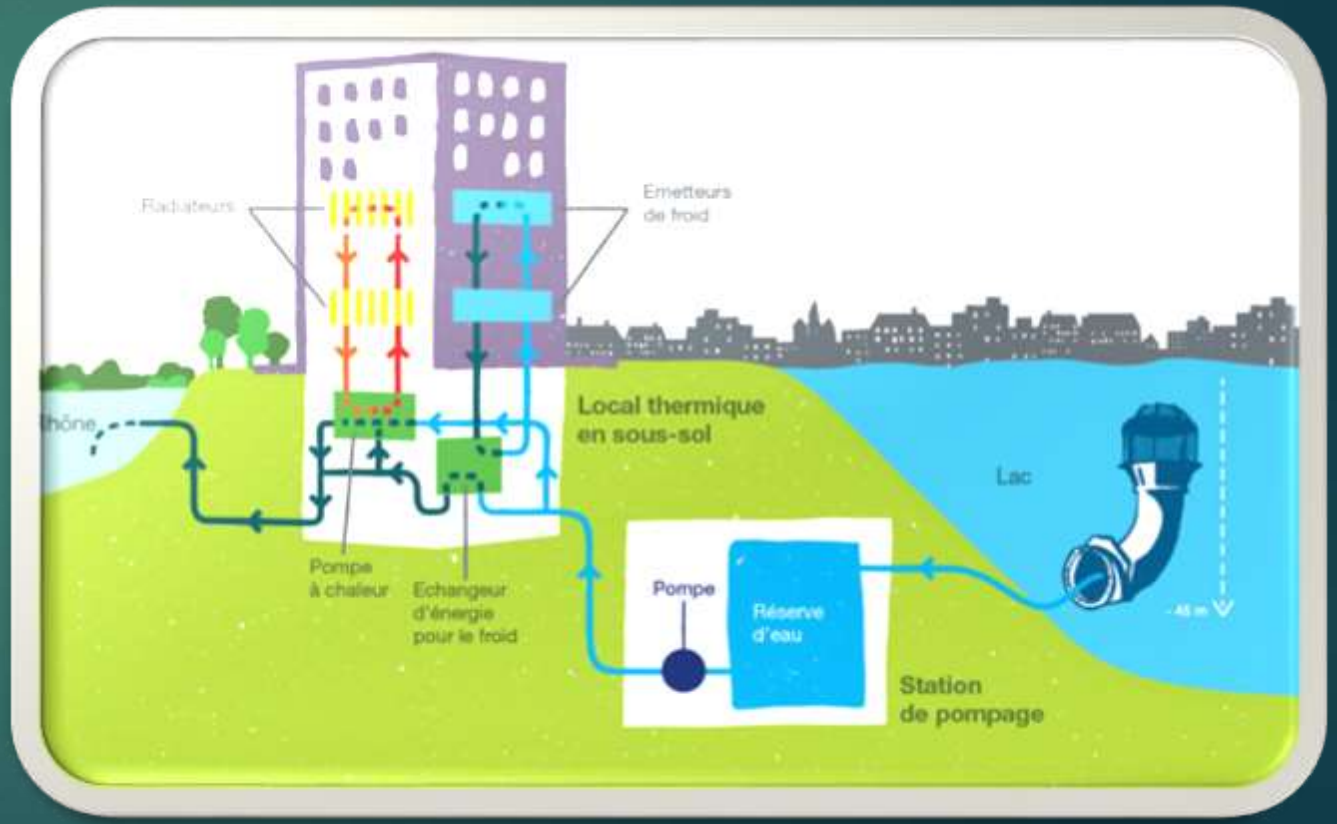
PSIA GVA & Intraplan 2014

EAST WING PROJECT

- Response to expected increase is infrastructural addition: a new East wing (2014- 2020.)
- Advanced sustainability parameters:
  - 5000m2 of solar panels
  - Rainwater recovery
  - Thermal insulation
  - Etc.
- Increase in controversy with neighboring municipalities.
  - Citizens groups managed to impose restriction on concurrent gate use from down to 6 from 9.
- But how ROBUST is this infrastructural addition? Can it ADAPT to the different scenariii?

Genilac distance / remote heating project for the UN buildings

- Circular heat-sinking system based on lake water at 45m maintains 7°C stable temperature throughout the year.
- Originated by State of Geneva, City of Geneva, FIPOI and SIG as a proof-of-concept GLN system serving the UN buildings (2008).
- In 2016 evolved to GENILAC and scaled up 10x energy-wise.
- Aims at providing 140MW by 2022, CO2 reductions by 80%



Source: SIG 2016

INTERCONNECTIONS

- GENILAC will connect with the airport in 2022, serving the entire new west wing.
- The airport becomes the hub for connecting to GENILAC the surrounding municipalities, whose sustainability agendas get a boost.
- The airport creates momentum local for sustainability agendas.
- Genilac adds to the robustness of infrastrucural addition: the East Wing investment becomes more easily recoupable by sharing benefits -- even should the traffic scenario change.

Transport Infrastructure

- Public transportation including TOSA BUS (Flash charging)
- Railway connection
- Soft mobility network (pedestrian and bike bridges)
- Individual cars

3- Understanding Infrasystem integration

System Components:

- *Nodes*
- *Links*
- Socio-technical complex

Proximity:

- *Co-Location*
- *Coordination*
- *Sharing*

Basic Function

- *Similar*
- *Different*

Infrasystems capacity for Sustainability Acceleration & Amplification

Acceleration: Overcome time/resources/power limitations because of **momentum** triggerered by **positive externalities** of another project.

Amplification: scaling up and bringing new actors into a collective sustainability strategy on the basis of concrete projects' integration.

- *Supportive ecosystem*
- *Reflexive leadership*
- *Availability of resources*
- *Inter-agency coordination*

To jumpstart Infrasystem integration Scale and decision making ecosystem matters

Mid-scale (Midsize cities , neighborhoods) work better

Jump-start projects with less constituents and less dispersion of authority.

Include Socio-technical complexes in solution buiding

Accelerate and Amplify sustianbility agenda → Use Infrassytems as a paradigmatic example to trigger Reflexive Leadership

4- Where to Begin & What to Deliver?

- Start from the particular
- Consider financial & environmental benefits of **specific forms** of integration
- Identify **process nodes** in non-exclusive networks.

- Start from the global agenda (eg SDGs)
- Align global and local strategies through integration.
- Develop Reflexive Leadership for consensus-building.

6- Critical Infrasystems and Sustainability

- With their scale and scope of activities and their ecological footprint and social role, critical infrasystems can direct flows (and resources) towards **greater efficiency , social equity and wellbeing of the population** (or the opposite).

- Any decision on Infrasystem development and retrofitting today has multiple intended and unintended consequences and will determine **effectiveness of service delivery capacity while triggering and supporting sustainability change**

- They can be **drivers of a change agenda** **or** **breaks to any change**