EXPLORING COMPLEMENTARITY OF LIFE CYCLE THINKING AND LANDSCAPE & URBAN PLANNING TOWARDS SUSTAINABLE URBAN CO-DESIGN

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AUTHORS

G. Bouillass[1],
J. Masafont[1,2],
M. Baronnet[3],
N. Bertho[3],
P. Blot[3],
J. Costanzo[3],
T. Dubard[3],
P. Frodé De La Forêt[3],
T. Gaudron[3],
J. Gerbaux[3],
A. Jousse Della Giustina[3],
V. Lannelongue[3],
E. Lesec[3],
R. Seailles[3],
H. Terrasson[3],
A. Wienhold[3],
B. Gschwind[1],
P. Blanc[1],
P. Perez-lopez[1],

AFFILIATION

[1], MINES ParisTech-PSL Centre Observation, Impacts, Energie (O.I.E.), France

[1,2], ADEME & Laboratoire de Recherche en Projet de Paysage -ENSP- , France.

[3], MINES PariTech-PSL, 2019 Civil Engineering promotion, France

CONTACT

ghada.bouillass@mines-paristech.fr
joris.mosafont@mines-paristech.fr

www.mines-paristech.fr
www.oie.mines-paristech.fr

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école nationale supérieure de paysage Versailles Marseille

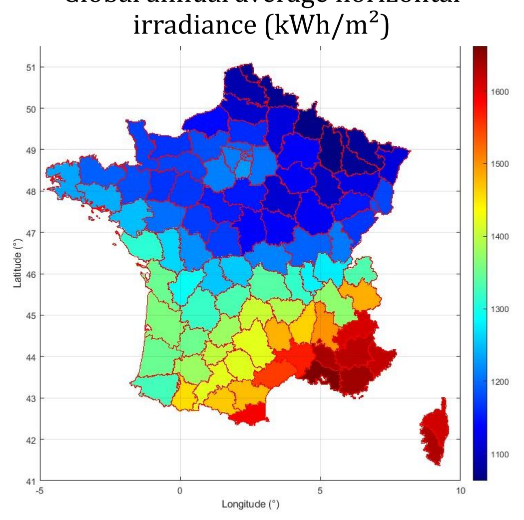
INTRODUCTION & OBJECTIVE

- City logistics is **one of the most polluting** segments of the **transport sector**.
- **European regulations** are pushing further urban access restrictions and promoting a shift to more **sustainable solutions**.
- Introducing sustainability into **communities living conditions** and **territorial policies** requires the consideration of:
  - living environment characteristics,
  - stakeholders' needs,
  - sustainable technologies with high environmental, social and economic performance.
- To face this challenges, the **complementarity** of two consistent management approaches have been studied:
  - Life Cycle Assessment (LCA)
  - Landscape and Urban Planning (LUP)

REAL CASE STUDY

- Study of the complementarity of both LCA and LUP throughout a real case study in the historical city of **Nice, South of France.**
- **Challenges:**
  Complex topography (i.e. narrow streets)
  High density population
  Increasing concentration of transportation flows
- **Opportunities:**
  Remarkable solar deposit encouraging the use of photovoltaics (PV).
  Transport policy shift towards electric mobility

Global annual average horizontal irradiance (kWh/m^2)

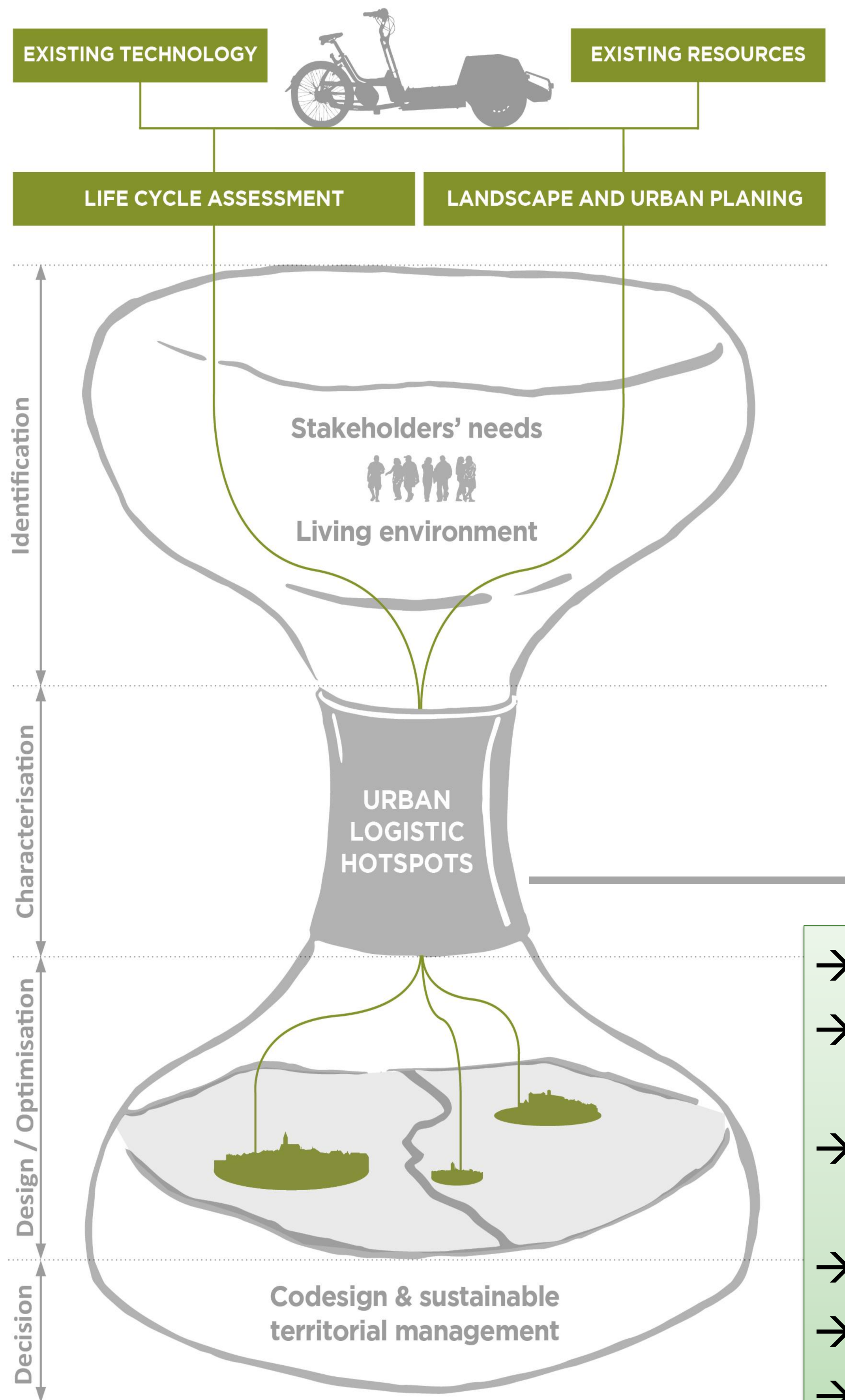


TOWARDS THE CONCEPTUALIZATION OF AN INTEGRATED SUSTAINABLE LOGISTIC SERVICE CO-DESIGN:

ELECTRIC BASED TRICYCLE TECHNOLOGIES FOR LAST KILOMETER DELIVERY

Tricycle technology for city logistics « Triporteurs de l'Ouest »

MATERIALS AND METHODS



STEPS FOR THE SUSTAINBLE CO-DESIGN OF CITY LOGISTIC SERVICES

Identification step

1. LUP application
   - Territorial reading grid based on:
     i) Physical, socio-cultural & economic resources
     ii) Political context
   - Field visits: urban configuration for logistics
2. LCA application
   - Diesel-power cargo vans vs electricity tricycles: from 285 to 28 gCO_2eq/km in EU
   - EU mix vs PV: from 400 to 22gCO_2eq/kWh

Characterization step

Crossing LCA and LUP through urban metabolism requirements

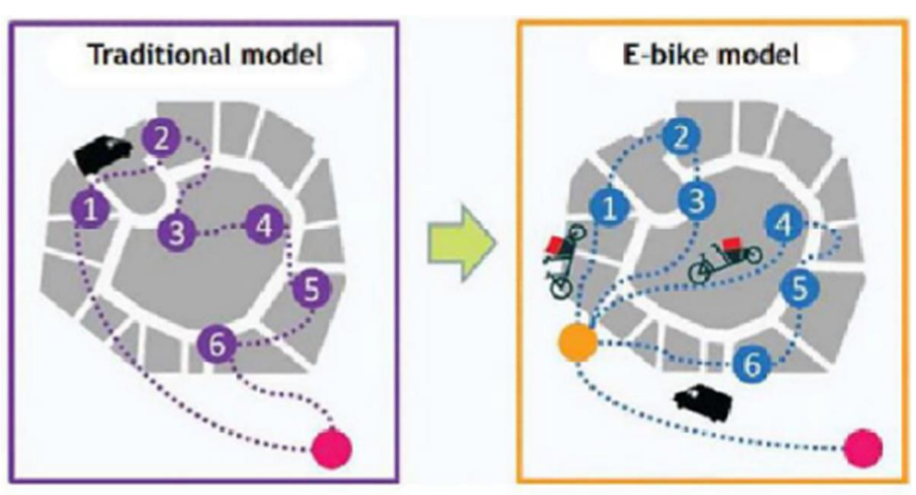
IDENTIFIED URBAN LOGISTICS HOTSPOTS

→ Environmental living conditions such as air pollution, noise and urban congestion
→ Stakeholders' needs and concerns (shopkeepers, workers, transport companies, public authorities, etc.) → Social hotspots
→ Constraints for scheduling and delivery distribution including technology capacity, time, topography and energy required
→ Economic performance of electric tricycles & charging infrastructures
→ Potential of renewable energy resources in electric mobility applications
→ Real-world local solar data, to be explored through Geographical Information Systems for energy use optimization.

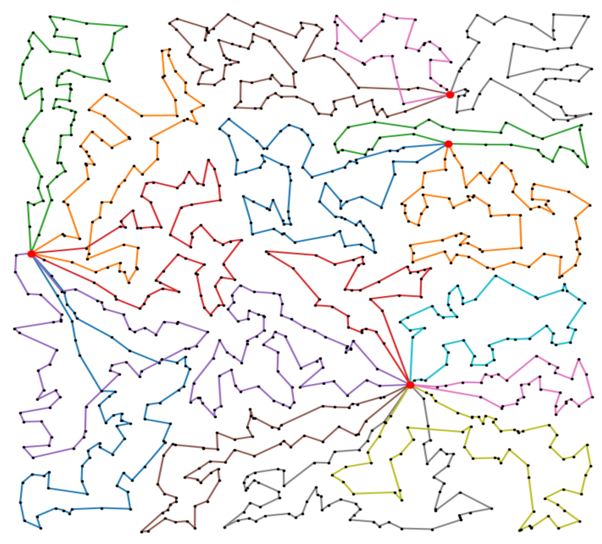
RESULTS & DISCUSSION

Design and optimization step : from the electric tricycle technology to Urban Logistic Platforms.

→ ***Optimization of delivery flows through a Clarke and Wright algorithm for 4 ULP and 1000 deliveries' points***



Distribution flows between the ULP and the delivery points in Nice city



Clarke and Wright Algorithm performed for 4 ULP and 1000 delivery points

→ ***ULP integration in the urban metabolism***

Design of the ULP and its integration in the city metabolism

→ ***Dimensioning of ULP and possible other usages of the platform (such as solar energy-based chargers for public electric vehicules) meeting stakeholders' needs and improving their living conditions.***

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