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


To cite this version:

HAL Id: hal-02913782
https://hal-mines-paristech.archives-ouvertes.fr/hal-02913782
Submitted on 10 Aug 2020

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**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 challenge, the complementarity of two consistent management approaches has been studied:
  - Life Cycle Assessment (LCA)
  - Landscape and Urban Planning (ULP)

**MATERIALS AND METHODS**

**REAL CASE STUDY**

- Study of the complementarity of both LCA and ULP 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

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

**ELECTRIC BASED TRICYCLE TECHNOLOGIES FOR LAST KILOMETER DELIVERY**

**STEPS FOR THE SUSTAINABLE CO-DESIGN OF CITY LOGISTIC SERVICES**

**Identification step**

1. **ULP 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 gCO₂eq/km in EU
   - EU mix vs PV: from 400 to 22 gCO₂eq/kWh

**Characterization step**

Crossing LCA and ULP 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**

- **ULP integration in the urban metabolism**

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

**ACKNOWLEDGMENTS**


**AFFILIATION**

1. MINES ParisTech-PSL Centre Observation, Impacts, Energie (O.I.E.), France
2. 1-2 ADEME & Laboratoire de Recherche en Projet de Paysage -ENSP-, France.
3. MINES ParisTech-PSL, 2019 Civil Engineering promotion, France

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