Using TIMES on non-energetic purposes

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Context

*Figure:* Urban and rural world population evolution.

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Figure: Bordeaux Bassins à flots plan.

Source: ANMA
Addressing urban growth

How to feed the model

Land-use optimization model

Perspectives

Context

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Figure: Bordeaux Bassins à flots plan.

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Figure: RES example.
What can prospective modeling bring to the issue?

Optimization bottom-up models:

- **Long-term** study;
- **Scenario-based** approach (as urban planners);
- **Territory** centered (no general solution);
- **Optimization** flexible tool;
- Integrated assessment with **energy and environmental issues**.
Data gathering

*Figure:* Bordeaux Metropolitan territory, colored by cities (27 gathered) and separated by IRIS zones.

From Bonhomme, 2013, Adam et al., 2005, Cerezo et al., 2017, Gonçalves et al., 2017 and Delmastro et al., 2016 among others.
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Outputs

Figure: Map of clusters created on parameters concerning land-use.
Reference land system

Figure: System used
Zoom on the land-use archetypes

**Figure:** Around land-use archetypes
Energy related and environmental outputs

**Urban constraints:**

- *Limited areas* by local plans;
- *Historical center* and other specific areas;
- *Lifespan* of buildings;
Energy related and environmental outputs

**Urban constraints:**
- *Limited areas* by local plans;
- *Historical center* and other specific areas;
- *Lifespan* of buildings;

**Environmental constraints:**
- WHO recommendations on *green areas access* [WHO Regional Office for Europe, 2016];
- *Limited artificialization* of the land;
- *Retrofitting program* to diminish buildings performing weakly;
- ...
Results: DPE constraint

A < 50
B 51 à 90
C 91 à 150
D 151 à 230
E 231 à 330
F 331 à 450
G > 450

kWhEP/m².an
Results: DPE constraint

- **Addressing urban growth**
- **How to feed the model**
- **Land-use optimization model**
- **Perspectives**

### Results: DPE constraint

- **Buildings**
  - Activity buildings 1 (2000-2012)
  - Activity buildings 2 (2000-2012)
  - Activity buildings 2
  - High 1970-1980 housing
  - High 1970-1980 housing
  - Historical buildings (< 1915)
  - Historical buildings (< 1915)
  - Middle size 1 (1970-1980)
  - Middle size 2
  - Middle size 2
  - Rural housing
  - Rural housing
  - Small housing suburbs 1
  - Small housing suburbs 1
  - Small housing suburbs 3
  - Small housing suburbs 3

### Classification

- **A**: < 50 kWhEP/m2.an
- **B**: 51 à 90 kWhEP/m2.an
- **C**: 91 à 150 kWhEP/m2.an
- **D**: 151 à 230 kWhEP/m2.an
- **E**: 231 à 330 kWhEP/m2.an
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**MINES ParisTech, PSL Research University, CMA**

**Prospective modelling and cities**

**SummerSchool CMA 2019 9 / 11**
Results: DPE constraint
Possible **coupling** with an energy model:

- Changing **final demand** using converting tools based on land-use model outputs [Le Gallic et al., 2016];
- Changing **technologies** themselves proposed to the model;
- **Constraining potential** of each technology (e.g. no collective heating if no collective buildings are built);
- Integrating all technologies in the land-use model.
Perspectives

Possible **coupling** with an energy model:

- Changing **final demand** using converting tools based on land-use model outputs [Le Gallic et al., 2016];
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- **Constraining potential** of each technology (e.g. no collective heating if no collective buildings are built);
- Integrating all technologies in the land-use model.

Other perspectives on land-use:

- Add urban planners’ **future projects**;
- Combine with **jobs and commercial sector** data;
- Link **transportation demand** with urban shapes;
Thank you!

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References


