

LCA-LCCA tool for pavements

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1. Motivation

- Difficulty in the decision making
 - Different types of pavements
 - Bituminous mixtures (hot, warm and cold)
 - Concrete mixtures
 - Recycled materials
 - ...
 - Different maintenance procedures
 - Overlay
 - Mill and overlay
 - Induction heating
 - ...

2. Research theme

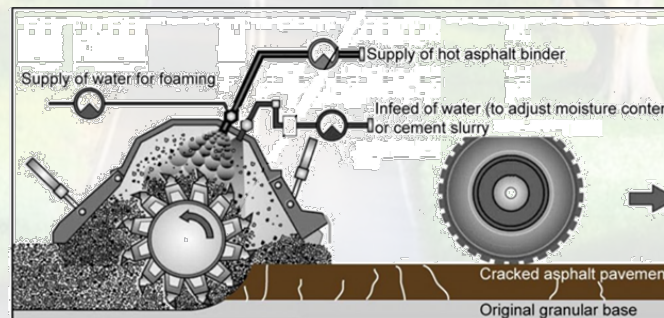
3. Planning



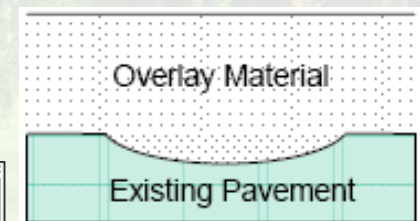
<http://wheatfield.ny.us/276/Town-Paving>



<http://www.aopandalucia.es>



<https://arkansasengineer.uark.edu/2012/12/03/in-the-lab-today-on-our-roads-tomorrow-dr-andrew-brahams-civil-engineering-lab/>



www.fhwa.dot.gov/publications/research/infrastructure/pavements/tpp/03049/paper3.cfm

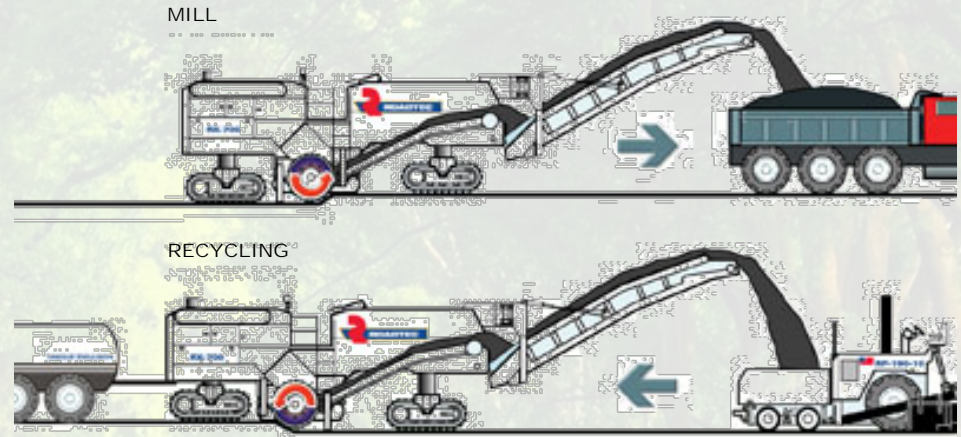
1. Motivation

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o Different end-of-life

- Recycling
- Landfilling



<http://www.construccion-pa.com/productos-y-tecnologia/rehabilitacion-de-carreteras-a-menor-costo/>

o Different selection criteria

- Economic
- Environmental
- Social



<http://www.lacrisactual.info/crecimientoeconomicocontinuo-la-gran-falaciadel-sistema-actual/>



<http://www.maat.com.co/>



<http://economiaes.com/empresas/social-escritura.html>

1. Motivation

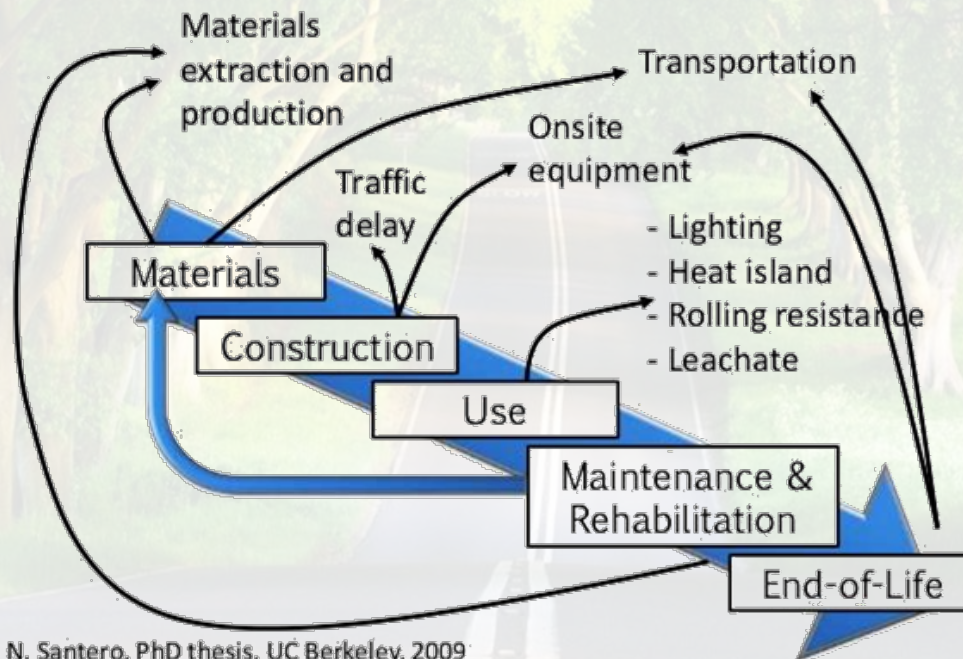
2. Research theme

3. Planning

- Current used tools
 - Commercial tools not specific for pavements (Gabi, SimaPro...)
 - Expensive
 - Necessity of knowing about the methodology of LCAs and LCCAs
 - Specific tools for pavements

Tool	Country	Free availability	Impacts	Lack
Palate	USA	✓	LCI	Use phase, traffic delay
Dubocalc	The Netherlands	X	✓	Use phase, traffic delay
Road-Res	Denmark	X	✓	Use phase, traffic delay, LCCA
asPECT	UK	✓	GWP	Use phase, traffic delay, LCCA
SEVE	France	X	GWP and energy	Use phase, traffic delay, LCCA

- Development of a specific tool for pavement
 - Using sustainable indicators
 - Life Cycle Assessment (LCA)
 - Life Cycle Cost Assessment (LCCA)
 - Considering all the phases of a pavement life

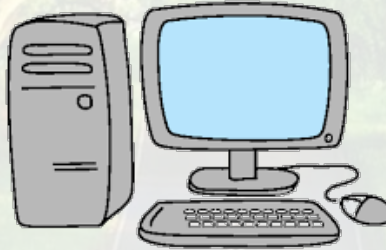


N. Santero, PhD thesis, UC Berkeley, 2009

- Optimized
- Easy to use
- Specific for Spain

Basic data:

- Materials
- Maintenance techniques
- Traffic



Environmental impacts

- Global Warming Potential
- Depletion of renewable materials
- Photo Chemical Ozone Formation
- Human Toxicity Potential
- Acidification
- ...

Economic dimension

Multicriteria analysis

1. Motivation

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Data base design

Definition of the
LCA/LCCA models

Optimization of
the models

Comparison
with other tools

Study case: Self-
healing mixes

