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Energy-transport-land use perspective

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What were the objectives?

- To provide analyses of the interactions between energy, transport and the environment that account for the interplay between urban functions, land-use patterns in agglomerations, intra-regional transport and climate policies.

- To propose measures beyond carbon pricing, i.e. urban planning policies oriented towards carbon emissions mitigation contributions.
Impact of sprawl on carbon footprinting
Toronto (Canada)

High-density apartment complexes within walking distance to a shopping center and public transit:
1,31 tCO2e/capita

High-density single family homes close to the city center and accessible by public transit:
6,62 tCO2e/capita

Suburbs with large, low-density single family homes that are distant from commercial activity and public transit:
13,02 tCO2e/capita

Source: GTZ
Some of the added value of Pashmina

- High level of academic inputs in particular in had hoc modeling and interaction of paradigm shift (Convergence and integration of series of models, dialogue betweens modelers)
- Dialogues between national and local perspective (ex Copenhaguen)
- Pedagogical (story lines), the « fruit salad » design scenarii
- Volontee to provide quantitaive results despite the very long term perspective (WP5)
- Technology cluster which will have a huge industrial impact
- Provide a lot of insight for debate policy relevance
- The link between technology, mobility and services is a great value
- Bridge between theory and reality even if its in a long term
Main outputs: progress in vision of rupture in transport

- Research aspects: (mainly through modelling)
  - Urbanisation and macro-economics
  - Impact of paradigm shift on behaviours and technology clusters according to living area
  - Mapping mobility and accessibility (Denmark) more than mobility (decoupling the accessibility to GDP)

- Quantitative
  - Apple: impact of technology (factor 2?)
  - Orange: impact of large change of behaviour (decoupling mobility and socio-economic related to the paradigm shift)
  - Potatoes: What happen if nothing will change
The paradigm shift in TEE
Some examples of cluster

- Electrical vehicle-Single family-house-and solar energy and reversible heat pump
- Fuel cell vehicle, car polling, hydrogen storage
- Metro-P&R and rented electric cars, good delivery optimisation,

We need more cluster description which also may include the housing dimension
Paradigm shift in TEE: Issues raised (1/3)

- Urban dynamics are affected by the cost of mobility which are trendly increasing particularly after 2050 leading with increase of city density (through a complex interaction)

- Densification requires additional investments in cities (higher building, denser public transport) which increases the land price particularly after 2050. But this investment is rather limited (0.1% GDP)?

- Introducing urban policies reduce transport mobility but increase unit consumption of vehicles? This leads to a decrease of the carbon tax which pushes up a little bit the GDP (0.25% GDP). Very few changes

- Doing fast leads doing big is questionable
Paradigm shift on TEE: Issues raised (2/3)

- The paradigm shift is more acting within each settlement rather than across settlements: dynamic dimension?

- Life styles are different according to the paradigm shift. Its implies different use of times and activities and transport mobility needs. Is it a choice or a constraint? (i.e. Chamonix snow oriented activities, Roma culture and Mykonos sea and sun activities).

- Is it true that the cost of mobility is more important than the cost of housing in the consumer choice optimisation (If any?)

- Conflict between need for density and for green open space may be not an issue for urban sustainability.
Paradigm shift on TEE: Issues raised (3/3)

- It is true that these paradigm shifts are not only technology substitution but also entails business, cultural, land use, city management, life style and consumer choices.

- The evolution of these factors are by far the most important ones but the reality and the impact of these changes are not well-known or mostly uncertain.

- Insufficient knowledge on time value

- Insufficient understanding on « beyond tangible »
Paradigm shift in TEE: Which type of policies

- Zahavi conjecture (only transport mainly valid for passenger): Increase of speed, coupling between speed and economic growth
- Increasing speed (unfortunately) leads to more energy (car, airplane)
- Environmental constrains leads to decouple speed and growth (modal split, reduce mobility or traffic etc.)
- Policies: Support the penetration of cross-sectoral and cross end-use cluster of technologies; increase cost of speed or increase the acceptance of reducing speed (taxes?); limits traffic, to support new transport services in relation to land use and urbanization, to act at national and local levels
- Energy sobriety begun to be suffered, we have to imagine a paradigm shift which allows us to choose our energy sobriety. Is it the Orange one?
Paradigm shift in TEE/ Policy recommendations

- Rising energy prices foster urban densification but energy efficiency improvement favours a re-dispersion of urban settlements
- Climate policy triggers densification which induced welfare losses and urban land prices
- Urban scale policies reduce the cost of climate policy in reducing the cost of climate policy with losses of household welfare
- What economists can propose beyond high international CO2 tax or shadow prices?
Technology Roadmaps coordinated by ADEME
Starting to describe technology clusters and to include paradigm shift

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<th>Low carbon vehicles</th>
<th>Energy storage systems</th>
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<td>Hydrogen and fuel cells</td>
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<td>CO2 capture and storage</td>
<td>Vegetable chemistry</td>
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<td>Smart grids integrating renewable energy sources</td>
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<td>Marine energy</td>
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<td>Positive-energy and low-carbon buildings and building clusters</td>
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<td>Plug-in electric and hybrid vehicle charging infrastructure</td>
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<tr>
<td>Mobility systems (1 and 2)</td>
<td>Contaminated soils</td>
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And coming: sustainable urban areas; thermal solar
The exemple of the ADEME’s Shared vision 2030-50

- **Buildings**
  - Whole renovation of social housing stock < 2005
  - Renovation of 5 millions houses
  - High penetration of heat pumps, thermodynamical and solar water heaters
  - Rebalancing between individual houses and collective buildings (50-50%)

- **Transports**
  - Individual mobility constant by 2030, and a light reduction by 2050 thanks to urban planning
  - Energy efficiency on thermical engines and technological penetration of plug-in and electric cars
  - Development of new mobility services (car pooling, car sharing...), collective transports and sustainable modes (walking, cycling...)

- **Renewable Production**
  - Very high potential for wind and PV energy
  - Important rise of storage capacity (pumped storage, vehicle battery), load leveling systems and interconnection
  - High development of methanisation and rise of renewable heat (biomass, solar, geothermal)
Towards Pashmina 2?
For a T-E-E-LU-H-I interaction approach

- Test a de-growth scenario versus Orange scenario (beyond tangible GDP)
- More story lines (ex trucks, single, aged couples) with more interactions between transport and housing and economic assessments
- Extra in-depth analysis of technology cluster in a radical situation and including new transport services
- To include more sociological input (behaviour change according to paradigm shift; which acceptance for modal shift, for dematerialisation)
- What type of radical and massive policies for radical paradigm shift can be implemented (Is an very (or too much) high CO2 taxation can be acceptable and equitable?). To provide a policy roadmap according to the paradigm shift
Personnaly I prefer the current situation than the Orange one. Please make it saleable.