5 Thoughts on The Transportation Transition Challenge

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MI-MIT Symposium: Perspectives on Sustainable Critical Infrastructure
23-24th March 2014

Image Credit: SkySails Gmbh

Wednesday, March 5, 14
Currently mainstream economic thinking advises planners and policy makers that:

- the best choices will be given to consumers automatically (markets)
- Consumers will choose the best for themselves (rational choice theory) and
- the optimum societal outcome will magically emerge (invisible hand)

Alas reality is much too complicated for relying on a fairy tale…
To EV or not to EV?

Emirati Males are passionate about their cars: They are an extension of their lifestyle and personality.

- Unavailability of charging stations: 64%
- Hassle of charging: 58%
- High price: 58%
- Short-range: 51%
- Battery life: 50%
- Small size: 39%
- Concern of performance in high temperature climate: 38%
- Don’t know how much the vehicle will be worth when I come to sell it: 34%
- Limited top speed (e.g. 130Km/h): 25%
- Unavailability/long waiting times: 21%
- None: 9%

Source: Sgouridis, Al Hadrhami, Farid (2012)
This economic view (and current infrastructure systems) were developed during a 300-year period of energy affluence.

Renewable energy, EVs, public transit, efficient cooling etc.

Seem inadequate to support current (affluent) lifestyle.

Because

our infrastructure (cities, buildings, networks) and our habits (social norms) developed during this period of energy affluence.
CRITICALITY OF ENERGY TRANSITION
TIMING AND RESOURCE AVAILABILITY

BAU (0.3% renewables, no carbon budget)

Energy Availability
(1.5% renewables, no carbon budget)

Climate-Constrained
(3% renewables, IPCC 2C 50% carbon budget)

→ Fossil fuels are on the way out – better design our future infrastructure accordingly

Source: Sgouridis & Csala (2014)
The future of Energy is Renewable (centralized & distributed)

hence

the future of Transport is Electric (with some biofuel and hydrogen carriers)
The Energy Economics Trap

Energy-dense fossil fuels = Cheap Energy

“Growth is inevitable

Infrastructure locks in on available energy premise

Focus on low upfront capital cost = high energy intensity

Pendulum swings to financial austerity

Debt (energetic and financial is accumulated)

Natural limits eventually become reflected in markets

“Race for what is left

Not sufficient surplus to invest in transition

“Economy decouples from inputs

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Climate Change

Waste
A canary in the coalmine of global financial system:

Greece in the energy trap

Athens air quality the worst since 1960… wood stove burning

Housing stock uninsulated / Retrofits are expensive / Credit not available / Intercity rail cutting service

Impressive renewable energy growth but society can barely afford the upfront cost – still less PV than Belgium

Demand destruction / Import collapse but trade balance remains negative
While the transition is inevitable its timing is critical
LOOKING AT RAIL NETWORKS

→ Clear correlation between density and use

THOUGHT #3

We have to build it, before they can come

Relevant themes:
- EV Charging Infrastructure
- Rail and Metro
  - (cf. the astonishing success of Dubai Metro)
- Car and the urban environment
- Bike-ways & pedestrian access
Curitiba, Brazil is a beacon of transit-oriented development
Success relied in early restriction of the center to automobile traffic – pedestrianization and parking limitations
Planning supported higher densities along the main transit corridors
>2 Million pax-trip/day

Source: Lindsay, Hidalgo & Facchini (2011)
Sometimes it is better to offer no alternative…

Behavioral economics demonstrates that our choices are heavily dependent on social norms and norms don’t change easily.

Until there is social acceptance, individuals will be willing to pay a higher price – even gaining in status.
If we want to fly in 2060, we need to:

(i) Leave sufficient carbon budget for the future, and
(ii) Divert most if not all biofuel production to aviation

Source: Sgouridis, Bonnefoy, Hansman (2011), Sgouridis (2012)
THOUGHT #5

Our infrastructure design during transition needs to take a holistic system view towards optimal resource allocation.

Using biodiesel/ethanol for land transport when they can be electrified is not the optimal use of our resources.

Source: Warshay, Pan, Sgouridis (2011)
“It is important to have an integrated view of the city. 
It is like the turtle embodying life, work and movement. 
If the turtle’s shell is fragmented it will die.”

“If you want creativity cut one zero from your budget. 
If you want sustainability cut two zeroes. 
If you want to make it happen, do it fast!”

Jaime Lerner, Architect and Mayor of Curitiba
Thank you