Where should the electric car develop in Ile de France?

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This paper is a work in progress. We try to evaluate the consequences of the development of the electric vehicle for commuting in the urban area of Ile de France.

Using the NEDUM-2D model developed at CIRE Grusdorf and Halle-gatte (2007) Viguié and Hallegatte (2012) we look at the locations where the electric car should become an interesting transport mode. We also analyze the influence of the introduction of the electric vehicle at a large scale on the mobility, on the urban form and on the CO2 emissions in Ile de France in 2020 and 2050.

NEDUM-2D allows to simulate the spatial distribution of households and buildings density, real estate values and housing surfaces in a city using the classical urban economics framework (Fujita, 1989) and taking into account the inertia of the urban system. The evolution of these variables partly relies on the households choices of housing surface and location. This choice results from the trade-off between what they spend for transport and the real estate price level. In order to simulate the Ile de France urban area evolution, we use the polycentric version of the model, which allows several job center.

We detail the technologies available in private transportation (cars) for the household.

We suppose three technologies: the classic car is the cheapest one but it consumes more fuel than the efficient one, which is more expensive. The electric car is the most expensive of the three technologies but consumes electricity and comparatively less energy than the two other ones. We suppose the electric car has an autonomy of 100km.

We suppose two main local scenarios, one in which the electric car is available in the city (is affordable and can be easily charged) and one in which not. Then we compare the evolution of the city.

Our results depends on the projections we use for the energy prices. We make several scenarios for these prices. If fuel prices are high enough, electric
cars lower the cost of car in some locations, especially for the ones far from center in which public transportations are less accessible. This brings more urban sprawl.

Comparing the mobility in the urban area, we note that contrary what is usually expected, the electric car owners do not locate in the city center. We show rings around the job centers where owner are interested in the electric car. Inhabitants of the center of the urban area (Paris) do not own lot of electric cars.

Concerning the CO2 emissions, we expect them to lower with the introduction of the electric car.

References

