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[www.datasim-fp7.eu](http://www.datasim-fp7.eu)



# DATA SCIENCE FOR SIMULATING THE ERA OF ELECTRIC VEHICLES





## MOBILITY AND ENERGY DEMAND IN A CHANGING WORLD

Part of a sustainable solution to reduce the externalities of car use such as congestion, energy consumption and the negative environmental effects, may lie in the *electrification* of road transport. Let us imagine a futuristic scenario where a mass-scale adoption of Electric Vehicles (EV) will materialize.

In terms of power demand, a major concern is that an uncoordinated EV use will result in a considerable load on the distribution grid. Also problems with peak load and voltage unbalance may occur, depending on the EV penetration degree. So some degree of market coordination may be necessary.

The real difficulty however lies in the fact that individuals' travel behaviour may thoroughly change due to EV. This may cause a deviation of the system optimum (which in fact also happens in the case of congestion in our current transport system).

In order to account for this, a fundamentally different modeling paradigm which is able to account for these intertwined effects is necessary. In DATA SIM this will be done very thoroughly at a highly detailed spatio-temporal and individual agent-based level.

## DATA SIM OVERALL OBJECTIVE

DATA SIM aims at providing an entirely new and highly detailed spatio-temporal microsimulation methodology for human mobility, grounded on massive amounts of big data of various types and from various sources.

The goal is to forecast the nationwide consequences of a massive switch to Electric Vehicles, given the intertwined nature of mobility and power distribution networks.

## DATA SIM AMBITION

While the increasing availability of big data about human activities provides radical new ways of understanding the social and ecological universe, it is our ambition in this project to complement this information with behaviourally rich data, pertaining to the purpose of human travels.

In terms of interdependencies, our advanced integrated methodological environment allows for more realistic and consistent linkages across travel choices made by the individuals in the course of a day than conventional models. It allows us to simulate tens of millions of individual agents, each with their detailed prediction of every activity-travel schedule, enabling more detailed segmentations based on user profiles of the agents, different activity types, trip duration and driving ranges.

Significant breakthroughs can be gained from the project, which lead to novel dimensions of use, along the milestones that were set forward in the European Industry Roadmap for the Electrification of Road Transport from today till 2020.

Many scientists have already pointed out that the goal of social sciences is not simply to understand how people behave in large groups, but to understand what motivates individuals to behave the way they do. This fundamental insight, which can be gained from this project, is a step forward towards the solution of this important challenge. It can help us to better understand the dynamics of our society and, in the longer run, to have an impact on overall and wider societal well-being.

## DATA SIM APPLICATION SCENARIOS

Once the fundamental research challenges have been overcome and the system has been built, we will investigate several real-life energy and mobility scenarios. It will enable unprecedented, actionable insights in (i) the management of the electrification of road transport, (ii) the intertwined effect of the mobility and power network and (iii) the efficient management of smart grids.

However, in theory, the model is not only sensitive towards the calculation of energy and mobility scenarios. Also other scenarios outside the targeted application domain can be accounted for.

