charging station siting for commercial electric vehicles" in Electric Vehicle Conference (IEVC), 2012 IEEE International, IEEE, 2012, pp. 1-3.

However, the determined routes for the vehicles in these documents have certain drawbacks. One of the drawbacks is that a long waiting time for a vehicle at a charging station may arise increasing unnecessarily the travel time for a vehicle. A further drawback is that the announced charging stops may be too frequent without using the capacity of the battery of an electric vehicle in an optimal way.

It is therefore an objective of the present invention to provide a method and a system for determining routes of vehicles which provides a more optimal drive range, more optimal charging stops and reduced waiting time along the route for a plurality of vehicles.

It is a further objective of the present invention to provide a method and a system for determining routes of vehicles which is more flexible in particular by taking into account more constraints of interest.

The aforementioned objectives are accomplished by a method of claim 1 and a system of claim ~~16~~15.

According to claim 1 the method is characterized by the steps of

a) Providing characteristics of charging stations, a number of vehicles and their respective start- and end-points of their trips and preferably of their intermediate points,

b) Generating a road network comprising road segments for the vehicles and a charging station network for the charging stations along route points in the road network,

c) Generating an initial route for each vehicle from the respective start-point to the end-point via the road network and/~~or~~ via the charging station network,

d) Selecting a generation method for generating routes for ~~the~~ said vehicles~~,~~ out of at least two generation methods,

e) Generating a new route for ~~a~~ each vehicle based on one or more prior generated routes for ~~the~~ each vehicle according to the selected generation method,

f) Evaluating the generated new route for each vehicle based on one or more parameters,

g) Comparing the evaluated route with prior generated routes~~,~~ for each vehicle,

h) Replacing one or more of the prior generated routes for each vehicle with the evaluated route according to a result of the comparison,

i) Checking if the new route~~s~~ for each vehicle ~~satisfy~~ satisfies one or more final criteria and if yes, defining the new route~~s~~ for each vehicle as being the optimal route~~s~~ for the corresponding vehicle~~s~~, otherwise perform at least steps d)-i) again

According to claim ~~16~~ 15 the system is characterized by

Input means for inputting characteristics of charging stations, a number of vehicles and their respective start- and end-points of their trips and preferably their intermediate points,

Network generation means for generating a road network comprising road segments for the vehicles and a charging station network for the charging stations along route points in the road network

Route generation means for generating an initial route for each vehicle from the respective start-point to the end-point via the road network and/~~or~~ via the charging station network, and for generating a new route for ~~a~~ each vehicle based on one or more prior generated routes for ~~the~~ each vehicle according to the selected generation method,

Selecting means for selecting a generation method for generating routes for ~~the~~ said vehicles~~,~~ out of at least two generation methods,

Evaluating means for evaluating the generated new route for each vehicle based on one or more parameters,

Comparing means for comparing the evaluated route with prior generated routes for each vehicle

Modifying means for replacing one or more of the prior generated routes for each vehicle with the corresponding evaluated route for each vehicle according to a result of the comparison and

Checking means for checking if the new route~~s~~ for each vehicle satisfy one or more final criteria

and if yes, defining the new route~~s~~ as being optimal route~~s~~ for the corresponding vehicles,

otherwise instruct at least the selecting means, the evaluation means, the comparing means, the modifying means and the checking means for reprocessing.

According to the invention it has been recognized that the method and the system for determining routes of vehicles may take a plurality of constraints into account while at the same time being fast and reliable.