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A Survey of Study and Analysis of Electric Road (E-Road)

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ABSTRACT: Project delivery method refers to the owners' approach in organizing the project team that will manage the entire design and construction. There are several delivery methods that can be used on construction projects. They can be categorized in three groups: traditional design-bid-build, construction management and design-build.
The allocation of charging station problem was framed in a multi-objective framework considering the economic factors, power grid characteristics such as voltage stability, reliability, power loss as well as EV user's convenience and random road traffic. The placement problem was solved by using a Pareto dominance based hybrid algorithm amalgamating Chicken Swarm Optimization (CSO) and Teaching Learning Based Optimization (TLBO) algorithm. Finally, the Pareto optimal solutions were compared by fuzzy decision-making.
This project evaluates the effectiveness of project delivery methods in dealing with the different project objectives. Owners' objectives can be categorized into 8 groups including cost, time, scope, quality, owner's organization, funding / cash flow, project characteristics and risk and relationships. Forty construction experts were contacted and filled a questionnaire that evaluates the effectiveness of each method in achieving each of the objectives.
Data was then analysed and summarized to find the effectiveness of each method. A comparison among the different delivery methods is presented in this paper. The results indicate that alternative delivery methods such as design-build and construction management have higher effectiveness in achieving most of the owners' objectives than the traditional design-bid-build method.

KEYWORDS: Design-build, Bid-build, Cash flow, Funding, Owner's Organization.

I. INTRODUCTION

The population and related crisis are increasing day by day in India and becoming worst day by day. The main crisis facing is the pollution of various natural resources like air water , noise etc. The main cause for air pollution is the gas exhausted by petrol and diesel cars which emits CO2 and creating air pollution on large amount As motor industries are evolving to minimize this by manufacturing electric cars in large amount ,the emissionof CO is getting reduced so as to minimize air pollution As electric vehicles needs charging points to charge themselves for run , the number of fuel stations (charging points) is less as compared to electric vehicles which lead to rethink manufacturing of electric vehicles.The less number of charging points leads buyers to rethink about the electric vehicle. Denmark has the goal of becoming independent from fossil fuels by 2050, as it is outlined intheir "Energy Strategy 2050" [1]. In order to achieve this goal,the transport sector must transition from fossil fuels (95% of all the energy consumed by this sector [2]) towards renewable energy sources. Moreover, such a transition would have a significant impact on the total consumption of fossil fuels in the country as transport accounts for 66% of the total energy consumption from non-renewable sources in Denmark.Within the Danish transport sector, road transport presents a particularly interesting case, as it is responsible for 75% of the energy consumed in this sector.

Charging station placement problem concerns researchers across the world. Deb et al. [1] reviewed various aspects of charging infrastructure planning like global scenario, modelling approaches, objective functions, and constraints. The charging station placement problem is formulated considering only transport network in [4]-[6]. Liu et al. [4] considered construction cost and running cost as the objective functions along with the charging need as a constraint in their formulation. They applied Adaptive Particle Swarm optimization (APSO) for solving the complex problem.

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| Volume 4, Issue 6, June 2021 |

The aforesaid approach was tested on a road network of Beijing. Bendiabdellah et al. [5] formulated the charging station allotment problem for the city of Cologne in Germany.
EV battery and power electronic devices costs are steadily falling [20, 21]. This rapid decline is mostly due to a grow- ing manufacturing industry, which is constantly increasing the knowledge, the number of applications and the improve- ments of both these technologies. As the costs are falling, the trends of EV battery energy density, gross weight and semi- conductor devices performances are following exactly the opposite direction; in fact, with equal capacities, batteries are becoming ever smaller and lighter and the power elec- tronic devices ever more performing [22]. All this impacts the choice and the size of the charging systems. The sizing procedure of a suitable charging system is made even more difficult by the presence of many different technologies of the onboard and off-board chargers and also different cost, dimensions, weights, power rating; and so on.
Therefore, in order for Denmark to achieve their goal of being fossil fuel independent, it must find a cost-effective way of using renewable energy sources for road transport without modifying, in a significant way, the driving patterns of private and commercial vehicles. Battery electric vehicles (BEV) are one of the most promising and popular technologies to lead this energy transition. However, this technology still presents some drawbacks that need to be overcome such as its higher cost, limited driving range and longer charging times when compared with conventional vehicles. In this context, Electric Road Systems (ERS) that allow BEV to charge while driving have emerged as an alternative to deal with the main drawbacks of BEV.

Since ERS are expected to be deployed in highways and roads connecting urban and industrial areas, the required battery capacity in the vehicles can be reduced without sacrificing the range and simultaneously reducing the vehicle's cost. Moreover, the fact that charging is performed while drivingeliminates the need to stop at fast charging stations. Despite all the aforementioned advantages, since the implementation of a nationwide ERS requires a significant investment, it is necessary to evaluate the different ERS technologies in order to determine which one is the most cost-effective for the Danish society.
The Electrical Vehicle (EV) development has become a hot topic recently. The global market of EV will reach 2.6 million units in 2015. The carbon release due to EV charging is arousing critical environmental concerns. Apart from environmental and economical reasons, the most sig- nificant driving force of EV market is strong policy, includ- ing legislations, benefits and rebates from various govern- ments. Regardless of the initiative, the rapid growth of elec- tric vehicle definitely increases the energy demand. It was reported that the extra energy demand of EV may further increase the peak demand and cause the distribution cir- cuit congestion [15]. More importantly, it was pointed out that the EV hype may reduce CO2 emission if appro- priate demand side management (DSM) strategy is adopted. In [1], it was high-lighted that the
U.S electric infrastructure is designed to meet the highest expected de- mand for power, which only occurs a few hundred hours a year (at most 5% of the time). For 95% of the time, the electric grid is seriously underutilized and therefore huge amount of green gas is generated unnecessarily. Unfortunately, the U.S. electric grid is not a special case.

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| Volume 4, Issue 6, June 2021 |

II. LITERATURE REVIEW

Sr. No.	Name of Author	Name of Journal and Year	Title of paper	Conclusions
1	Viktoria Swedish ICT on behalf of Volvo GTT and Scania CV	Scania CV in year of 2013	Slide in Electric road system , Inductive project report	It gives information about transfer of energy from road to vehicle base.
2	Stefan Tongur	Doctoral thesis in 2018	Analyzing the development of electric road system from a business model perspective	The business model concept could be used so as to make it in practical.
3	Silvano Cruciani ,Tommaso Campi,Francesca Maradei and Mauro Felizian	Department of Astronautics, Electrical and Energetics Engineering, Sapienza University of Rome	Active Shielding Applied to an Electrified Road in a Dynamic Wireless Power Transfer (WPT) System	The active shielding coils halve the magnetic flux induction beside the electrified road where humans can stay

Sr. No.	Name of Author	Name of Journal and Year	Title of paper	Conclusions
4	Pranay Vijay Ashtankar, Pratik H. Bendle , Krunal Kene, Milind R. Kalbande1, Pratik Makhe , Prof. S.M. Dhomne	International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3 in March 2014	Road Power Generation (RPG) by Flip plate Mechanism	RPG is possible answer for battery charging station and also for the lightning of the street light
5	R. Balieu, F. Chen & N. Kringos	Road Materials and Pavement Design, 2019 Vol. 20	Life cycle sustainability assessment of electrified road systems	The CO2 emissions associated with the construction of an eRoad using the IPT technology is 45% higher than the traditional case,
6	C.Gowri,N.Saranya, T.Shanmugapriya , B.Bommirani	First International conference on NexGen technologies 6th Jan 2018	Road power generation (RPG) by Flip plate mechanism	We can use this generated electricity for charging coils present under bitumen

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| Volume 4, Issue 6, June 2021 |

SUMMARY OF VOLTAGE GENERATED VERSUS SPEED OF VEHICLES

Sr. No.	Speed of vehicles (Km/hr)	Voltage generated (volts)
1.	10	8.93
2.	20	7.32
3.	30	6.05
4.	40	5.65

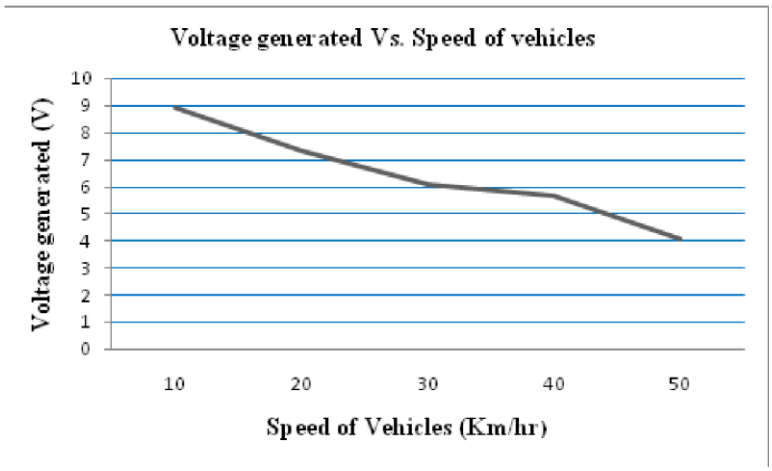

Figure no-1 The graph between voltage generated & under different speed of vehicles

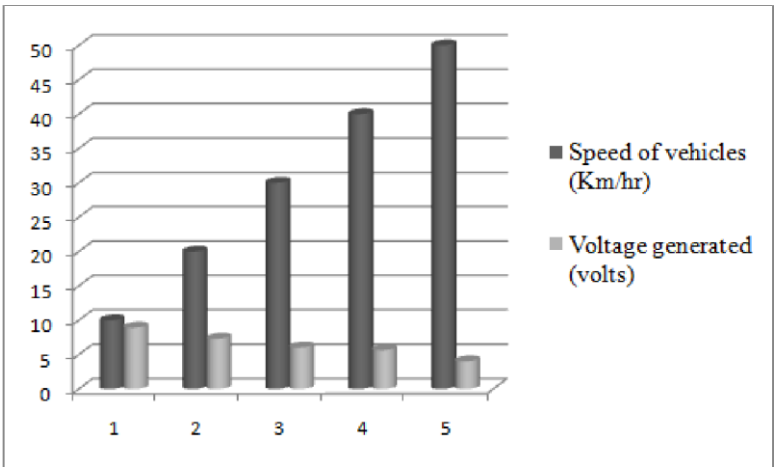

Figure no-2 The bar chart between voltage generated & under different speed of vehicles

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| Volume 4, Issue 6, June 2021 |

Comparison of different batteries

Parameters	Lead acid	NiMH	Li-ion
Nominal cell voltage (V)	2.1	1.2	3.6
Specific energy (Wh/kg)	30-40	50-80	150-250
Specific power (W/kg)	250	<1000	<2000
Energy density (Wh/l)	50-90	150-200	150-250
Charge/discharge efficiency (%)	70-92	66	98

Summary of voltage generated & load of mans and vehicles for the RPG

Sr. No.	**Load of man vehicle (kgs)**	**& Voltage generated (V)**
1.	360	8.33
2.	430	9.57
3.	470	10.44
4.	500	11.34

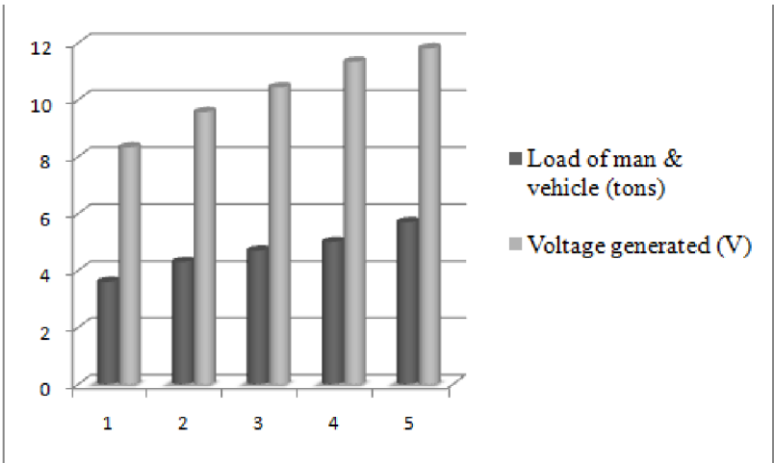

Figure no-3 The bar chart between voltage generated & load of man and vehicle

IV. **CONCLUSION**

A smart meter for residential applications has been presented in detail, in addition to the communication architecture between the smart meter and the aggregator via a cloud database, including a set of rules for a read/write procedure, useful for sending commands from the aggregator to the smart meter and receiving the respective replies.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 5.928

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Smart charging is a service managed by the aggregator and carried out by the smart meter via the local electric vehicle supply equipment. The aggregator receives measurements from the smart meters within a 5 s time resolution, it calculates the community profile by summing up the community members' profiles and regulates the charging of electric vehicles accordingly.

Using the technology of electric road (E-Road) we can save a lot of artificial generated electricity and investment in place for charging points. This technology also minimise efforts which an electric car owner has to take for charging point to charge the vehicle. This technology also could be good to down the rates for electricity for charging on vehicles.

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