

## Electric Motor Vehicle

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**Abstract**— This work attempts to study the benefits of plug-in hybrid technology for two-wheelers with a suitable retrofitting to a scooter. Simulation of energy and power requirements with a given driving cycle was carried. In addition, the battery mass required and the cost to meet the power by battery alone were also estimated. In order to estimate daily average travel distance of two wheelers, a survey was conducted in the Coimbatore city. Based on the survey, a control strategy has been proposed to suit the heterogeneous city traffic pattern.

**Keywords:** Electric Motor Vehicle

### I. INTRODUCTION

As the two-wheelers contribute to two-thirds of the total vehicle population in India, the implementation of plug-in hybrid concept for the existing two-wheelers may save a large quantity of petrol with little consumption of electricity. If this electricity can be produced by renewable sources like solar, wind, hydro, etc. then it will save consumption of imported petrol to a large extent.

In the 1990s, there was another wave of interest in electric vehicles. Car manufacturers like Renault, Peugeot, and Citroën in Europe and GM in the US produced tens of thousands of electric vehicles. However, the market was rather “immobile”. Even worse, GM recalled all his leased EVs and crushed them one by one. This is well documented in the film *Who Killed the Electric Car?* [2]. But times are changing. In 8 years, lithium battery prices dropped by 80% while the specific energy of the battery increased significantly [3,4]. As a result, we can expect affordable electric vehicles on the market with a driving range of above 400 km. There is an exciting e-mobility future in front of us.

2. Electric Driving: Sparking Your Interest While climate change sparks interest in electric driving, it raises many questions as well. Professor Joeri Van Mierlo tackles them one by one [5].

2.1. Is Electric Driving Really the Best Solution for the Environment? The short answer is yes. When discussing environmental impact, it is important to take into account the full life cycle of a vehicle. This allows looking beyond emissions from the vehicle itself to the environmental impact of batteries, the production of electricity, and so forth. In a full life cycle, electric vehicles emit two times less carbon dioxide (CO<sub>2</sub>) in comparison to diesel engines if we take the European electricity mix. This can be even four times less if we take, for example, the Belgian electricity mix. If cars were driving on sustainable electricity, carbon dioxide emissions could be further reduced by more than 10 times. If we look at vehicles from a “well-to-wheel” perspective, electric vehicles produce four times less particulates and 20 times less nitrogen oxides (NO<sub>x</sub>) (Belgian example) compared to conventional vehicles. However, we need to stress that the exploitation and mining of raw materials in South America, Africa, and China leaves much room for improvement. Recycling can further reduce the environmental impact. It is not so easy to compare all the alternatives. Fortunately, we have scientific methods

to do this for us, namely the life cycle analysis models (LCA), which compares all these factors in an unbiased way. If we take into account both climate change and air quality, the difference between petrol, diesel, LPG, and natural gas-driven cars is minimal. Hybrid and plug-in hybrid vehicles can improve scores with a factor two. The overall environmental impact of battery-electric vehicles can be up to five times smaller than conventional fuels when considering the Belgian electricity mix as an example [6,7].

2.2. How do Electric Vehicles Affect Our Economy? Research indicates that the electrification of our transport system would generate one million additional jobs in Europe in 2030 and double in 2050 [8]. These jobs relate to the production of components for electric vehicles, but they also relate to new services, such as charging infrastructure. Electrification will also reduce our oil dependency. The import of oil costs the European economy one billion euros per day [8]. Investing this in our own economies could mean a vast improvement in employment rates. Families could increase their purchasing power when they no longer need to depend on imported oil products. It is suggested, however, that loss of income from duties and taxes on diesel and petrol will negatively impact government budgets. However, this does not take into account improved air quality. Improved air quality will have a positive effect on the health budget, resulting in less expenses for health care and the cleaning of monuments, for example.

2.3. What Will Our Vehicle Fleet Look Like in 2050? Apart from electric cars, self-driving or autonomous vehicles will have made their appearance by 2050. Even though both technologies are not dependent on each other, electric cars are better World Electric Vehicle Journal 2018, 9, 13 of 5 candidates to become self-driving cars. Autonomous cars depend on electronics for their control. It therefore makes sense to equip them with an electric motor. Autonomous vehicles need different charging infrastructure than the electric vehicles that are on the market now. The self-driving car from 2050 will seek its own charging point when needed, and charging points will therefore be organised differently and in other locations. It will no longer be necessary to own a car. You will be able to use your smartphone you plan your car or mobility needs the same way you plan other items in your agenda today. At 7 am, a fully charged vehicle will be waiting in your driveway

In cities this is a problem. Almost 90% of families in Brussels, for example, have no private garage and depend on public charging infrastructure. Apart from standard charging points, fast chargers will find their place on motorways, in cities, and in suburban areas. These fast chargers can fully charge a battery in 15 to 25 min. The development of batteries is taking fast leaps forward. Within five years, a battery will double its storage capacity, and by 2020, its price will be halved. Many car manufacturers are bringing the coming years affordable electric vehicles on the market with a driving range of above 400 km

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Car Buying Guide." National Geographic. n.d. n. page. Web. 14 Mar. 2014.

<<http://environment.nationalgeographic.com/environment/green-guide/buying-guides/car/environmental-impact/>>.

"Origins of Agriculture." Encyclopedia Britannica Academic Edition.

<<http://www.britannica.com/EBchecked/topic/9647/origins-of-agriculture/10678/Developments-in-power-the-internal-combustion-engine>>.

published, even if they have been submitted for publication, must be cited as "unpublished" [4]. Papers that have been accepted for publication must be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols. For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].IV. SOME COMMON MISTAKES The word "data" is plural, not singular. The subscript for the permeability of vacuum 0 is zero, not a lowercase letter "o." In American English, periods and commas are within quotation marks, like "this period." A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.) A graph within a graph is an "inset," not an "insert." The word alternately is preferred to the word "alternately" (unless you really mean something that alternates). Do not use the word "essentially" to mean "approximately" or "effectively." Be aware of the different meanings of the homophones or homonyms, "affect" and "effect," "complement" and "compliment," "discreet" and "discrete," "principal" and "principle." Do not confuse "imply" and "infer," nor "ensure" and "insure." The prefix "non" is not a word; it must be joined to the word it modifies, usually without a hyphen. There is no period after the "et" in the Latin abbreviation "et al." The abbreviation "i.e." means "that is," and the abbreviation "e.g." means "for example." When using these abbreviations, they should be followed by a comma, e.g., as used in this sentence. An excellent style manual and source of information for science writers is [7].

#### ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g." Try to avoid the stilted expression, "One of us (R. B. G.) Thanks ..." Instead, try "R.B.G. thanks ..." Put sponsor acknowledgments in the unnumbered footnote on the first page. REFERENCES [1] G. Eason, B. Noble, and I.N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529-551, April 1955.

#### REFERENCES

- [1] G. Eason, B. Noble, and I.N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529-551, April 1955.

- [2] J. Clerk Maxwell, *A Treatise on Electricity and Magnetism*, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68-73.
- [3] I.S. Jacobs and C.P. Bean, "Fine particles, thin films and exchange anisotropy," in *Magnetism*, vol. III, G.T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271-350.
- [4] K. Elissa, "Title of paper if known," unpublished.
- [5] R. Nicole, Title of paper with only first word capitalized," *J. Name Stand. Abbrev.*, in press.
- [6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," *IEEE Transl. J. Magn. Japan*, vol. 2, pp. 740-741, August 1987.

