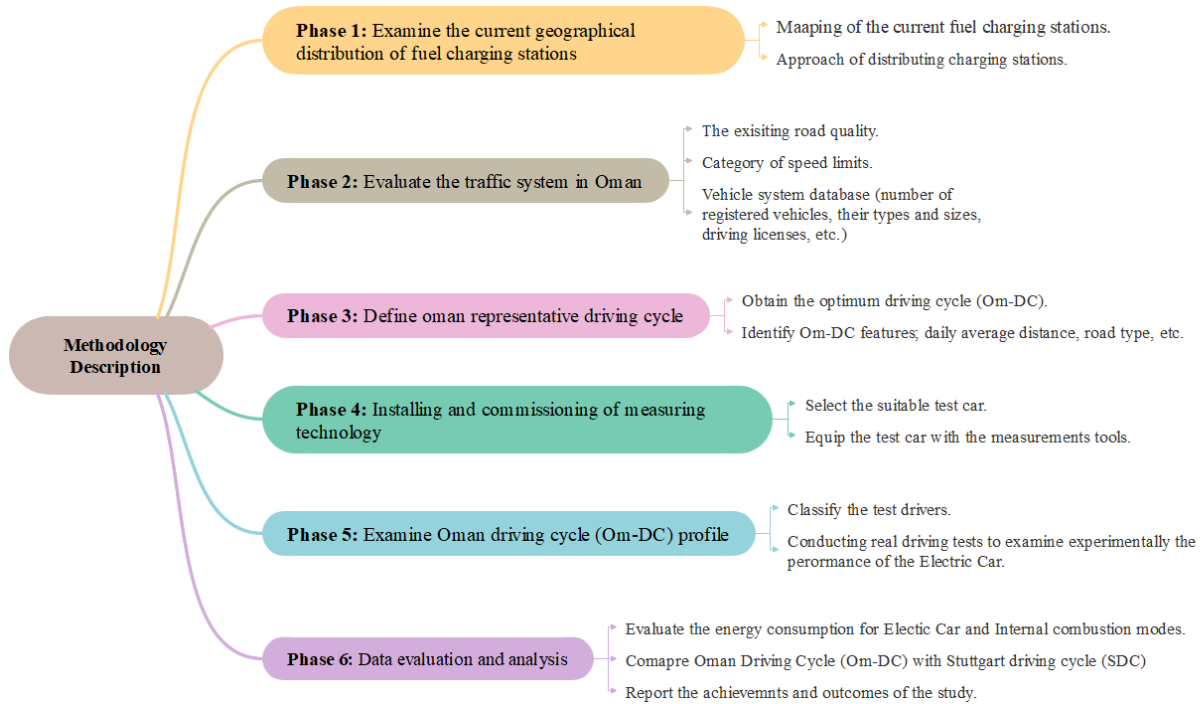


Project Title: Study the Technical-Economical Feasibility of Using Electric Cars as an Eco-Transport Option in Oman
Supervisor's Name: Dr. Abdullah Al-Janabi
Co-Supervisor(s): Dr. Nasser Al-Azri
Sources of Fund:

Research Field(s): Energy and Environment
<p>Summary and Problem Statement:</p> <p>Dependence on fossil fuels is one of the challenges facing Oman and is mainly related to the frequent fluctuation of its price as well as the environmental impacts of extensive burning of fossil fuels. To be less dependent on fossil fuels, it is required to adopt the new renewable energy technologies. One of these technologies is the electro-mobility (Electric Cars). Nowadays, the development approaches implemented by the Electric Car manufactures created an effective enhancement in the performance of electric cars represented by lowering the electric energy consumption and extending the driving range. This, in fact, accelerate the diffusion process of this technology especially in USA, Europe, and East Asia market. For instance, the "National Electro-mobility Development Plan has been launched in Germany to speed up research and <i>development</i> in battery electric cars and their market.</p> <p>However, the diffusion of Electric Cars in Arab Gulf region in general and in Oman in specific is unfortunately invisible. The plausible reasons behind that are attributed to i) the absence of the scientific/systematic approach for examining the technical-economical feasibility of such innovative technology, ii) reliance on an excessive amount of fossil fuels, and iii) the insufficient knowledge of the local society about electro-mobility.</p> <p>Accordingly, a collaboration research project will be established between Sultan Qaboos University (SQU) and the Research Institute of Automotive Engineering and Vehicle Engines Stuttgart (FKFS) in Stuttgart and Institute for the Internal Combustion Engines and Automotive Engineering (IVK) at Stuttgart University, Germany. The project is designed to have six dependent phases where the real driving cycle of Oman (OM-DC) will be defined and tested to examine the real performance of Eclectic Cars in Oman in general and in Muscat in specific. The results of this project could serve as a tool to make Electric Cars in Oman popular and enhance the transport sector. The outputs of this project will in line with the main goals of Oman Vision 2040.</p>
<p>Keywords: Electric Cars, Eco-Transport, Driving Cycle, Technology Diffusion.</p>
<p>Objectives:</p> <ol style="list-style-type: none"> 1) Investigate the performance of Eclectic Cars in Oman through real driving tests. 2) Identify the challenges of using Eclectic Cars an eco-transport option in Oman. 3) Analysis the existing infrastructure in Oman and determine the required development to enhance the market of Electric Cars in Oman. 4) Evaluate energy consumption, economic and environmental effects associated with using Electric Cars in Oman. 5) Create new entries to the concept of sustainable energy analysis.

Tentative Methods of Approach:

The tentative research methodology is designed in an objective manner to obtain and examine the performance of the driving cycle in Oman (OM-DC) throughout six dependent phases that described in detail as shown in the Figure.



Required backgrounds and skills

Backgrounds:

The student should have basic knowledge about thermodynamics and basic information about car components and their work principle.

Computing Skills: MATLAB (basic level) or any other computer language

Other requirements:

The student should have driving license to drive the car and do the required tests.

References:

[1] Sujit Kumar Jha, (2013), Application of Solar Photovoltaic System in Oman-Overview of Technology, Opportunities and Challenges, *International Journal of Renewable Energy Research*,, Vol. 3, pp.331-340.

[2] United Nations Framework Convention on Climate Change, NFCCC, 2005.
http://unfccc.int/files/essential_bacground/convention/status_of_ratification/application/pdf/ratl.

- [3] Sultanate of Oman renewable readiness assessment. International renewable energy agency. Technical report, November 2014.
- [4] COWI and Partners LLC. Study on renewable energy resources, Oman. Report no. 66847-1-1, May 2008.
- [5] Omanet.om. (n.d.). Government. Retrieved from <http://www.omamet.om/english/government/state.asp?cat=gov>
- [6] Global Research, Oman Economic Overview (www.globalinv.net), 2011.
- [7] NCSI. (2012). Statistical Year Book . (N. C. for S. and Information, Ed.). Muscat, Oman.
- [8] Independent Statistics and Analysis, (<http://www.eia.gov/emeu/cabs/Oman/Full.htm>) 2011.
- [9] Abu Mohareb O., Huynh P.-L., Al-Janabi A., Grimm M. Reuss H.C. Electric vehicles in the Gulf region: performance and potential. SAE Technical Paper 2015-01-1685, 2015, Detroit, USA., doi:10.4271/2015-01-1685.
- [10] Abdul-Wahab S.A., Charabi Y., Al-Maamari R., Al- Rawas G.A., Gastli A., Chan K. CO₂ greenhouse emission in Oman over the last forty-two years. *Renewable and sustainable energy reviews* 2015; 52:1702-1712.
- [11] Solanki P.S., Mallela V.S., Zhou C. Estimation and diminution of CO₂ emissions by clean development mechanism option at power sector in Oman. *International journal of energy and environment* 2013; 4:641- 652.
- [12] The World Bank Indicator (<http://data.worldbank.org/indicator>), 2009.
- [13] Oman Tribune (<http://www.omantribune.com/index>), 2010.
- [14] E. Graham-Rowe, B. Gardner, C. Abraham, S. Skippon, H. Dittmar, and R. Hutchins, "Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations" *Transportation Research Part A: Policy and Practice*, 2012, 46 (1), pp. 140-153.
- [15] T. Lieven, S. Mühlmeier, S. Henkel, and J. F. Waller, "Who will buy electric cars? An empirical study in Germany", *Transportation Research Part D: Transport and Environment*, 2011, 16 (3), pp. 236-243. T. M. Sweda, and D. Klabjan, "Agent-based information system for electric vehicle charging infrastructure deployment", *Journal of Infrastructure Systems*, 2014, Vol. 21 No. 2, pp. 04014043.
- [16] T. M. Sweda, and D. Klabjan, "Agent-based information system for electric vehicle charging infrastructure deployment", *Journal of Infrastructure Systems*, 2014, Vol. 21 No. 2, pp. 04014043.
- [17] J. Axsen, J. TyreeHageman, and A. Lentz, "Lifestyle practices and pro-environmental technology", *Ecological Economics*, 2012, Vol. 82, pp. 64-74.
- [18] N. D. Caperello, and K. S. Kurani, "Households' stories of their encounters with a plug-in hybrid electric vehicle", *Environment and behavior*, 2012, Vol. 44 No. 4, pp. 493-508.

- [19] O. Egbue, and S. Long, "Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions", *Energy policy*, 2012, Vol. 48, pp. 717-729.
- [20] E. Graham-Rowe, B. Gardner, C. Abraham, S. Skippon, H. Dittmar, and R. Hutchins, "Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations" *Transportation Research Part A: Policy and Practice*, 2012, 46 (1), pp. 140-153.
- [21] A. F. Jensen, E. Cherchi, and S. L. Mabit, "On the stability of preferences and attitudes before and after experiencing an electric vehicle", *Transportation Research Part D: Transport and Environment*, 2013, Vol. 25, pp. 24-32.
- [22] J. S. Krupa, D. M. Rizzo, M. J. Eppstein, D. B. Lanute, D. E. Gaalema, K. Lakkaraju, and C. E. Warrender, "Analysis of a consumer survey on plug-in hybrid electric vehicles", *Transportation Research Part A: Policy and Practice*, Vol. 64, pp. 14-31, 2014.
- [23] B. Lane, and S. Potter, "The adoption of cleaner vehicles in the UK: exploring the consumer attitude–action gap", *Journal of cleaner production*, 2007, Vol. 15 No. 11-12, pp. 1085-1092.
- [24] A. Peters, and E. Dütschke, "How do consumers perceive electric vehicles? A comparison of German consumer groups", *Journal of Environmental Policy & Planning*, 2014, Vol. 16 No. 3, pp. 359-377.
- [25] O. Abu Mohareb, Phan-Lam Huynh, A. Al-Janabi, M. Grimm, H. C. Reuss, "Electric Vehicles in the Gulf Region: Performance and Potential", SAE 2015 World Congress & Exhibition, 2015.