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## AUTO LPG AS AN ALTERNATIVE FUEL AND ITS PROSPECTS TO COMBAT AIR POLLUTION IN GUWAHATI CITY, ASSAM, INDIA

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### Abstract

Auto LPG is considered as an environment friendly fuel. Auto LPG powered cars emit less pollutants compared to the other conventional fuels by 15-20% less carbon dioxide (CO<sub>2</sub>) than their petrol- and diesel-motivated counterparts and emit virtually no nitrogen oxides (NO<sub>x</sub>) or particulate matter (PM). LPG is legal to use as an automobile fuel by Government of India by Liquefied Petroleum Gas (Regulation of use in Motor Vehicles Order, 2001 dated 1<sup>st</sup> August 2001 under instruction from the Hon'ble Supreme Court to reduce automobile pollution in Indian cities. There are more than 27 million Auto LPG vehicles in use around the world. In India, there are about 2.32 million vehicles running on Auto LPG in 2018 with 1300 filling stations in 500 cities. In Assam there are four refineries. At present Guwahati is considered as one of the most polluted city in India. So, Government policies and regulations is very much essential to popularize auto LPG as an alternative fuel in Assam for improving the air quality as well as to combat climate change. In 2007, four numbers of Auto LPG dispensing stations were set up in Assam which is now in non-functional mode. In this paper a survey was conducted to analyze the awareness and extent of adoption and perception of Auto LPG in Guwahati City.

### Introduction

Fossil fuel plays an important role in the development of modern society [1]. It provides approximately 81% of the world's commercial energy supply [2]. Presently, we are very much dependent on fossil fuels for our energy requirements, with the extensive use the fossil fuel resources are reducing in a high rate. With the increasing consumption of fossil fuel, it has become a matter of concern for the whole world of depleting sources at a very fast rate [3]. Considering the current rate of consumption of fossil fuel across the globe, scientists have predicted that it will become increasingly scarce in the next 100 year [4]. Combustion of fossil fuel releases large amount of greenhouse gases, among which carbon dioxide is the most significant one. Researchers from all the over the world have agreed that the main contributor of CO<sub>2</sub> to the air is the vehicular emission by burning of fossil fuels [5]. As our transportation system is more than 90% dependent on fossil fuel, by considering its depletion and rising greenhouse gases and air pollution it is our utmost necessity to search for an alternative solution.

In the present situation of growing concerns over energy crisis and environmental pollution and degradation of ambient air quality, Auto LPG is considered to be the best alternative solution. LPG has been used as an alternative fuel for road vehicles since the 1900s [6]. LPG used in as automobile fuel, popularly known as Auto LPG is the third most popular fuel in the world [7] [8]. There are more than 27 million vehicles are powered by using Auto LPG globally which represents less than 3% of the total market share. Approximately half of all Auto LPG fueled passenger vehicles are in the five largest markets i.e. Turkey, South Korea, Poland, Italy, and Australia [9]. Government of India has permitted the use of LPG as an automobile fuel in India vides "Liquefied Petroleum Gas (Regulation of use in Motor Vehicles Order, 2001" dated 1<sup>st</sup> August 2001 under instruction from the Hon'ble Supreme Court to reduce automobile pollution in Indian cities [10]. In India, there are 1300 filling stations in 500 cities selling Auto LPG. The main cities in India selling Auto LPG are Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu [11].

Most of the leading vehicle manufacturers of the country like Maruti, Hyundai Motors, Tata Motors, General Motors etc. offer factory fitted LPG variants. Besides Auto LPG conversion kits are also using by many people in the country. Like the other states of India, Assam is also facing the severe vehicular pollution with degrading ambient air quality. Guwahati is the main city of Assam and has dominated headlines over the past few weeks as one of the most polluting city in the country. The level of air pollution in Guwahati city is in the "severe" category. As per the Central Pollution Control Board (CPCB)'s daily AQI bulletin, on 15 January 2020, Guwahati was



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recorded as the most polluted city in India, as it recorded a 24-hour average Air Quality Index (AQI) of 393 which was eight units short of 'severe' air quality levels [12].

During 2017-2017 total numbers of vehicles counted on road as 3309551 with registered vehicles 416726 numbers [13]. This number is increasing day by day and the emission is degrading the environment by creating major environmental pollution which is a burning topic that the whole world is facing. Everyone is aware of the problem, but there is lack of action on the problem. Considering the present scenario, there is a need for a concrete action by the Government. Government to take immediate steps to reopen the Auto LPG stations in the state to mitigate the air pollution problem.

### Objective of the Study

1. To find out the extent of awareness on different aspects of Auto LPG in Guwahati city
2. To find out the extent of adoption and perception of the aware customers in Guwahati about the Auto LPG.

### Methodology

To fulfill the objectives of the study, the data were collected from both primary and secondary sources. Primary data are collected by a field survey. For that two separate sets of questionnaire were prepared, one for the user of conventional fuels (petrol) and the other for the users of Auto LPG. A total number of 100 respondents were approached, where 50 were the customers of conventional fuels and 50 were the customers Auto LPG. Secondary data were collected by reviewing Government policies, regulations and legislations, research papers, articles etc.

In Assam Auto LPG was introduced in 2007 by Assam Oil Division, Indian Oil Corporation. Two LPG stations were setup in Chandmal Sarawagi & Co. Chandmari, Guwahati- 781021 and Kishore & Co. Adabari, Guwahati-781012. The Auto LPG station at Chandmari is at non-functional state from 2016. The station in Adabari area too is fully out of order since 2014. The station is in fact fully dysfunctional for all types of fuels- Petrol, diesel and Auto LPG. They are presently planning to convert that place to a commercial building. So data for Auto LPG users were collected for 50 customers by Snowball Sampling Method. The survey was also conducted for 50 customers of conventional fuel within the Guwahati city.

Total 100 respondents were approached for the questionnaire survey.

### Results and Discussion

After conducting the study in Chandmari, Adabari and its nearby areas, it was found that among the conventional fuel users, 24% customers strongly agree and 72% customer agree that people are not aware of the Environmental benefits of alternative fuel, whereas only 2% each of conventional fuel customers disagree and strongly disagree with the statement. Again 30% of conventional fuel users strongly agree and 66% agree on that people are not using alternative fuel due to unavailability. Again among them 30% strongly agree and 56% agree to switch over to alternative fuel if it is made available. Only 6% disagree and 1% strongly disagrees with this statement. 8% strongly agree and 92% agree that Govt. should make alternative fuel compulsory. 28% strongly agree and 60% agree that Oil marketing companies should promote alternative fuel, whereas 8% disagree and 4% strongly disagree on this statement. The indicative statistics and graph of survey for the conventional fuel users are shown below.

**Table 1: Perceptions of Conventional Fuel Users**

Perceptions of Conventional Users										
Parameters \ Scale	Not Aware of Environmental Benefit of Auto LPG		No using due to unavailability		Willing to Switch Over to Auto LPG if Available		Govt. should make Auto LPG Compulsory		OMC should Promote Auto LPG	
Strongly Agree	12	24%	15	30%	15	30%	4	8%	14	28%
Agree	36	72%	33	66%	28	56%	46	92%	30	60%
Disagree	1	2%	1	2%	6	12%	0	0%	0	8%
Strongly Disagree	1	2%	1	2%	1	2%	0	0%	2	4%

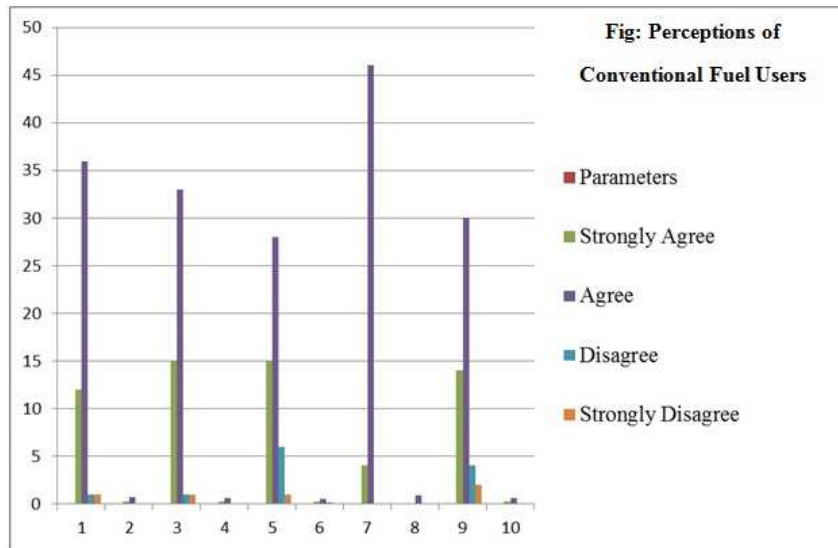


Figure 1: The indicative graph of Perceptions of Conventional Fuel Users

When the survey was done for the customer of Auto LPG, it was found that among the Auto LPG users, 70% customers strongly agree and 24% customer agree that Auto LPG is cost effective, whereas only 6% Auto LPG customers disagree with the statement. Again 30% of Auto LPG users strongly agree and 66% agree on that people are satisfy with after using Auto LPG, whereas each 2% Auto LPG customers disagree with the statement. Again among them 24% strongly agree and 72% agree that users should recommend Auto LPG to others. Whereas, each 2% disagrees and strongly disagrees with this statement. 8% strongly agree and 92% agree that Auto LPG is environment friendly. 12% strongly agree and 84% agree that Auto LPG is not popular as it is not easily available. The indicative statistics and graph of survey for the alternative fuel users are shown below.

Table 2: Perceptions of Auto LPG Users

Perceptions of Auto LPG Users										
Parameters Scale	Auto LPG is Cost Effective		Users are Satisfied with Auto LPG		Users will Recommend Auto LPG to others		Auto LPG is Environment Friendly		Not Popular as not easily Available	
	Strongly Agree	35	70%	15	30%	12	24%	4	8%	6
Agree	12	24%	33	66%	36	72%	46	92%	42	84%
Disagree	3	6%	1	2%	1	2%	0	0%	0	0%
Strongly Disagree	0	0%	1	2%	1	2%	0	0%	0	0%

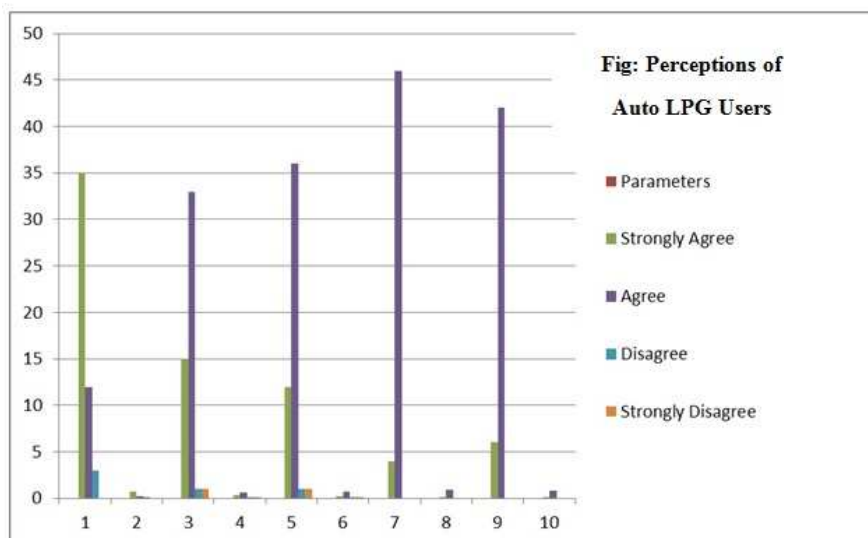


Figure 2: The indicative graph of Perceptions of Auto LPG Users

## Conclusion

The study reveals that Auto LPG has been unable of to penetrate the market as an alternative fuel in Guwahati City, in spite of having many environment and financial benefits due to lack of awareness among the people, strong initiative by the government, unavailability and continuous supply of Auto LPG fuel. The government should re-introduced Auto LPG as a part of their policy to mitigate environment pollution only. They also try to aware people about the environment and financial benefit. Old vehicles should be restricted to run on conventional fuel convert them dual fuelled vehicle by installing Auto LPG kit. Assam has four numbers of refineries and the bulk LPG produced as the bi-product can easily use as an alternative source of fuel.

We can say that auto LPG has a very good future prospect as an alternative green fuel. The traffic volume will still increase in the future. With implementation of government policy, regulations, public awareness related to environmental and health benefits, increasing dispensing stations, availability of qualified retrofitters etc if these weaknesses and threats can be modified then Auto LPG will be the best alternative fuel for improving the environment and mitigating climate change for the sustainability of our future.

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