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Overview on market analysis of hybrid cars

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Abstract

The Main focus of this review paper is to study and understand the non-technical issues like affordability, availability etc. faced by hybrid vehicles against non-hybrid vehicles in the market. Though hybrid vehicles can be extremely beneficial for the environment and can become a key factor for sustainable development, their value still remains unperceived to the society resulting in huge demand for pure gasoline vehicles which in turn compels automobile industry to manufacture these vehicles on a massive scale further resulting in rise of pollution level and consumption of non-renewable fuel.

Keywords: Hybrid, ecofriendly, economical, affordable, market

Introduction

Today's world is in dilemma between untenable and sustainable development. Some are trying to exploit while the remaining trying to sustain resources. Use and exploitation from non-renewable sources of energy has increased significantly for scientific developments for a better cause but the true potential of renewable sources is unknown to majority of people which result in extensive usage of commodities relying on non-renewable energy resources (like fossil fuel). Since most of the automobiles are dependent on fossil fuels, need for vehicle running on less fuel consumption has risen which resulted in invention of hybrid cars. A hybrid car is one that combine two energy sources i.e. electric and gasoline thus reducing the total amount of fuel consumption for a sustainable future. Though people are aware of its usefulness, their affordability and availability becomes a major issue especially in India (discussed later). The following is figure describing how the power transmission takes place in hybrid vehicle.

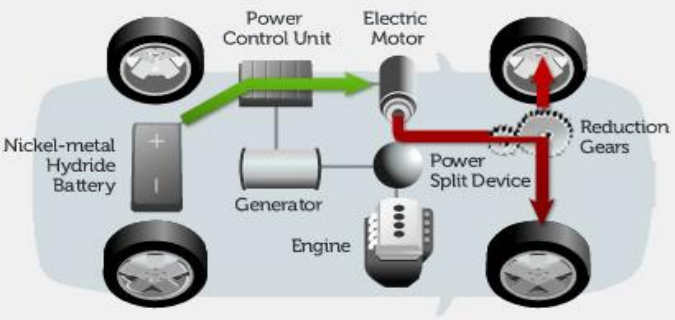

Fig 1: Hybrid Car terminology

Impact on Market

Even though hybrid cars are eco-friendly, they are facing a huge competition in the market against pure gasoline and pure electric vehicles due to their cost, availability etc. The main reason behind their less popularity is the people's misconception that hybrid /battery powered cars are made for low performance, are less spacious and with fewer number of features. For example, in India, since not all/zero hybrids car are manufactured and the only way to use them is via import but importing them will result in addition of custom duty taxes further resulting in increment in their overall cost. On considering availability of electricity in India, which is scarce, hybrids have a very low market impact. Then the question arises how to tackle the problem? The solution is achievable if the government provides aid and make agreements with automobile companies (like Toyota, Ford, Chevrolet etc.) to change this whole picture for a better market platform. In the following charts, we can see the rise in sales for hybrids which nothing but the result of duties carried out by the government (for top 5 countries in figure 2 and globally in figure 3).

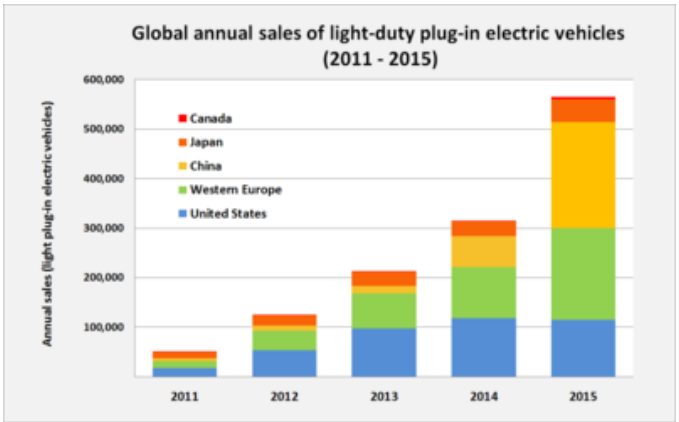

Fig 2: Sales chart for top countries that manufacture Hybrid cars 2011-2015.

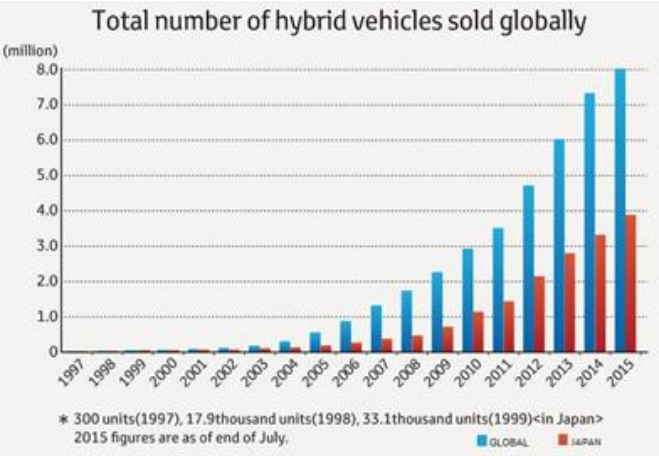

Fig 3: Global sales chart for hybrid cars (blue-global and red-japan) from 1997-2015

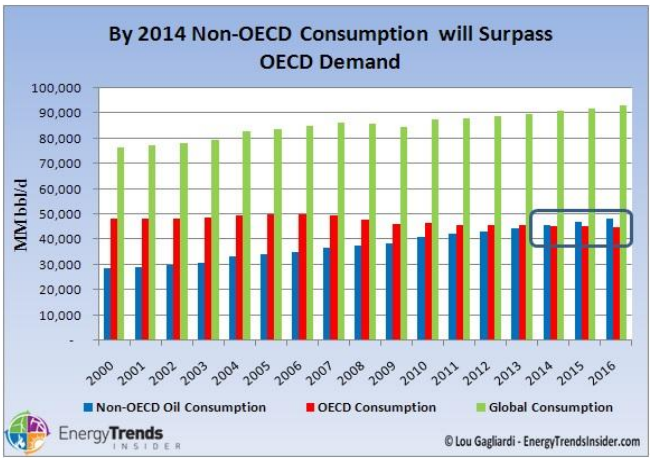

Fig 4: Above Chart depicting no. of barrels of crude oil consumption per year. Image Source –google.com. OECD stands for Organisation for Economic Co-operation and Development

Vehicle	City MPG	Hwy MPG	Avg MPG
Toyota Prius	51	48	49.5
Honda Civic Hybrid	40	45	42.5
Toyota Camry Hybrid	33	34	33.5
Chevrolet Malibu Hybrid	26	34	30
Nissan Altima Hybrid	35	33	34
Mercury Milan Hybrid FWD	41	36	38.5
Saturn Vue Hybrid	25	32	28.5
Mazda Tribute Hybrid 4WD	30	27	28.5
Ford Fusion Hybrid FWD	41	36	38.5
Mercury Mariner Hybrid FWD	34	31	32.5
Ford Escape Hybrid FWD	34	31	32.5
Ford Escape Hybrid 4WD	30	27	28.5
Mercury Mariner Hybrid 4WD	30	27	28.5
Mazda Tribute Hybrid 2WD	34	31	32.5
Lexus HS 250h	35	34	34.5
Toyota Highlander Hybrid 4WD	27	25	26
Lincoln MKZ FWD Hybrid	34	31	32.5
GMC Sierra 15 Hybrid 2WD	21	22	21.5
Chevy Silverado Hybrid 2WD	21	22	21.5
Lexus RX 450h	32	28	30
Chevy Silverado 15 Hybrid 4WD	21	22	21.5
GMC Sierra 15 Hybrid 4WD	21	22	21.5
Chevrolet Tahoe Hybrid 2WD	21	22	21.5
Chevrolet Tahoe Hybrid 4WD	21	22	21.5
GMC Yukon 1500 Hybrid 2WD	21	22	21.5
Lexus GS 450h	22	25	23.5
Cadillac Escalade Hybrid 2WD	21	22	21.5
BMW ActiveHybrid X2	17	19	18
Mercedes Benz S400 Hybrid	19	26	22.5

Fig 5: The following is a table depicting the mileage (approx. value) of all hybrid variant produced. MPG- Miles per gallon.

Hybrid car manufacturers must not only produce hybrid at reasonable cost but also forecast its future position which is a major and difficult task for any company starting from scrap. To earn trust of its customers and to maximize its production, market apprehension and/or skills for creating new market is must. Technologies that are advancing day-by-day must be efficiently utilized. Continuous market study is another skill by which one can understand the concept of supply and demand to maximize the sales.

Usability

For hybrid cars, the main factor that responsible for their maximum production, usage and sales value are their constructional geometry and internal features. People before purchasing any vehicle often asks the dealer about the car's mileage, safety features etc. If satisfied, then the customer will surely buy the car else will not turn up. So in order to create an impact in the market, the company must not only produce hybrid at reasonable cost but also look after its technological aspects.

For a car to be worth fetching for its customers, it must have-

i) Vogue Design

The cars must be designed in such a way that the first look of the customer would force him to exclaim "What a Beauty"

ii) Guarantee of Safety

There should be no compromisation with the safety features of the car else the company will lose its sales and reputation in the market.

iii) Feature packed

Company must provide more than standard features at an affordable cost to improve and maintain its market trust.

iv) Economical

Hybrids must be economical in all aspects so that they are affordable with less maintenance cost.

v) Fuel Economy

Since mileage is the key attraction of the customers, manufacturers must use evolving technologies beyond shadow of doubt so as to produce better and more fuel efficient vehicles at low running cost to decrease fuel consumption rate (refer figure 4 & figure5).

Contributors and their contrivance

A. Practicality

There are several magnates & key people of companies' like

- Elon Musk, CEO and Product architecture of TESLA MOTORS
- Takeshi Uchiyamada, Chairman of TOYOTA
- Ulrich Hackenberg, Head of Technical Development of AUDI
- Norbert Reithofer, Chairman of the supervisory board

- Carlos Ghosn, CEO of NISSAN
- Alan Batey, Senior Vice President of Chevrolet

Who have taken responsibility and a vital contribution in revolutionizing the world by engineering and manufacturing hybrid cars and making it affordable for society? Because of their brilliance and intellectual skill, the people are now having a greater desire for hybrids and are advising others to buy it for a sustainable future. Cars like BMW i3 and i8, Toyota Prius and Chevrolet Volt, Audi A3 sport back, Toyota Prius etc. are ruling the market on a global scale and proved to be a better asset to the customers. [Now you will think why I have included the name of Elon Musk and his company Tesla which manufactures pure electric car only, it's because Tesla has planned to open up charging spots for electric as well as hybrid car.]

B. Point of Issues

Regardless of global market statistical datas, there are some issues faced by both company and customer due to which, hybrids are facing a very tough market. Some of the common issues are-

- **Time and Belief**- Since 100% petrol/diesel dependent cars came long before the hybrids which are new generation technology, it will take a lot of time and struggle to compete with existing needs.
- **Affordability**- Since the concept and usage of hybrids are evolving and wide, it is difficult for a customer to decide his desires and expectations, thus the overall selection process becomes a hassle
- **Lack of external/On-Road Support**- For successful running period, hybrids also require external power station or charging spots, for which there has to be a huge investment.

From below chart, it is observed that hybrid cars are affordable but, it's important to know that most of all hybrid vehicles are not available in India and must be imported for which high import duty taxes are imposed resulting in increment in their overall cost. Thus only fewer number of hybrid vehicles are operational. [I have extracted the data from website and converted the cost in Rupees for better understanding. (Refer figure 6)].

Variant/Segment	*Hybrid Vehicle*	*Cost*	*Non-Hybrid Vehicle*	*Cost*
	Volkswagon Golf GTE	Rs 32 lacs	Volkswagon Cross Polo	Rs 7-7.2 lacs
Mini	Audi A3 e-Tron	Rs 19.92-22.74 lacs	Audi A3	Rs 27-28 lacs
	Ford C-Max energi	Rs 16.65-19.06 lacs	Ford Ecosport	Rs 7-11 lacs
	Toyota Prius PHEV	Rs 16.5-18 lacs	Toyota Corolla Altis	Rs 14.5-20 lacs
	Ford Fusion energy	Rs 17.93-20.34 lacs	Ford Fiesta	Rs 8.5 11 lacs
SEDAN	BMW 330e	Rs 23.40-26.62 lacs	BMW 1 series	Rs 28-30 lacs
	Chevy Volt	Rs 15.43-19.93 lacs	Chevrolet Cruze	Rs 14-17.76 lacs
	Hyundai Sonata PHEV	Rs 17.80-20.76 lacs	Hyundai Sonata	Rs 20-24 lacs
	Mitsubishi Outlander PHEV	Rs 28.40 lacs	Mitsubishi Outlander	Rs 22-25 lacs
	BMW X5 xDrive 40e	Rs 35.06-37.85 lacs	BMW X5	Rs 67-78 lacs
	Volvo XC90	Rs 38.70-41.46 lacs	Volvo XC90	Rs 70.9-125 lacs
SUV	Porsche Cayenne S E-Hybrid	Rs 44.01-47.22 lacs	Porsche Cayenne	Rs 1.0-2.4 crore
	Volvo V60 PHEV	Rs 50.21-55.40 lacs	Volvo S60	Rs 31-44 lacs
	Mercedes S550e	Rs 54.96-57.57 lacs	Mercedes S-Class	Rs 1.5-1.5 crore
Luxury ans Sports	BMW i8	Rs 79.14-81.42 lacs	BMW 6 series	Rs 1.15-1.77 crore
	Porsche Panamera S e-hybrid	Rs 53.05-55.92 lacs	Porsche Panamera	Rs 1.2-2.3 crores
CUSTOM DUTY		+ Rs 6 lacs(mini)-20 lacs(Suvs)		Rs 0

Fig 6: represents custom taxes imposed on hybrid cars that are imported in India (ranging from 6l1acs for mini to 20 lacs for SUVs and much higher for other segments)

C. Possible Solutions

In order to overcome such issues and compete in market, possible solutions are-

1. The best method in earning name and fame is hard work and giving 100% against all odds.
2. Captivate global market by constantly providing and utilizing technological opportunities.
3. Magnetize investors and sponsors for better financial stability.
4. Providing affordable On-ground services and technology

5. Make agreements with government for better import options on hybrid vehicles

Advantages of hybrid cars

1. **Environmentally Friendly:** As the name suggest they are gasoline powered car resulting in less emission of pollutants in the air (refer figure 6).
2. **Financial Benefits:** Hybrids are promoted by various figureheads around the globe, thus hybrids often come with variety of offers and benefits and extra accessories for free.
3. **Less Dependence on Fossil Fuels:** As name suggests, hybrids are less dependent on fossil fuels than non-hybrids
4. **Smooth Drive Experience:** Hybrid vehicles are crafted in such a way that the driver won't feel any sort of comfort ability inside the car
5. **Higher Resale value:** they have a higher resale value than other vehicles

Vehicle	Gas Reduction	CO2 Reduction
Toyota Prius	38%	42%
Ford Fusion Hybrid FWD	31%	36%
Honda Civic Hybrid	28%	31%
Lexus HS 250h	28%	30%
Lexus RX 450h	28%	30%
Lexus GS 450h	13%	13%
Nissan Altima Hybrid	19%	21%
Ford Escape Hybrid FWD	23%	26%
Mazda Tribute Hybrid 2WD	23%	26%
Lincoln MKZ FWD Hybrid	31%	36%
Mercury Mariner Hybrid FWD	25%	29%
Mercury Milan Hybrid FWD	31%	36%
Toyota Camry Hybrid	18%	24%
Ford Escape Hybrid 4WD	19%	24%
Mazda Tribute Hybrid 4WD	19%	21%
Mercury Mariner Hybrid 4WD	19%	24%
Toyota Highlander Hybrid 4WD	23%	26%
Chevrolet Malibu Hybrid	8%	11%
Saturn Vue Hybrid	21%	20%
Chevy Silverado Hybrid 2WD	16%	23%
GMC Sierra 15 Hybrid 2WD	16%	23%
Cadillac Escalade Hybrid 2WD	35%	27%
Chevrolet Tahoe Hybrid 2WD	30%	23%
GMC Yukon 1500 Hybrid 2WD	16%	23%
Chevy Silverado 15 Hybrid 4WD	16%	19%
GMC Sierra 15 Hybrid 4WD	16%	19%
Chevrolet Tahoe Hybrid 4WD	30%	19%
Mercedes Benz S400 Hybrid	16%	15%
BMW ActiveHybrid X2	11%	6%
Average	**21%**	**23%**

Fig 7: The table on the left describes the amount of pollutant emitted when compared to a model of same variant

Disadvantages of Hybrid cars-

1. **Lesser Power output and low initial torque:** Even though hybrids are powered by dual engine, the overall power output and torque is lower compared to non-hybrids.
2. **Light Weight isn't always good:** Manufacturers try to make hybrid vehicles as light as possible for saving fuel and high power output by comprising safety wherever possible
3. **Maintenance Is Difficult:** Since there is a constant evolution in the field of science and technology and it is difficult to keep working with the old technology making it difficult to maintain over a long period.
4. **Expensive to buy and manufacture:** Hybrids car are expensive to manufacture, thus increasing overall cost
5. **Not purely electric:** Since hybrids are not purely electric and do require gasoline, they are considered as misnomers.

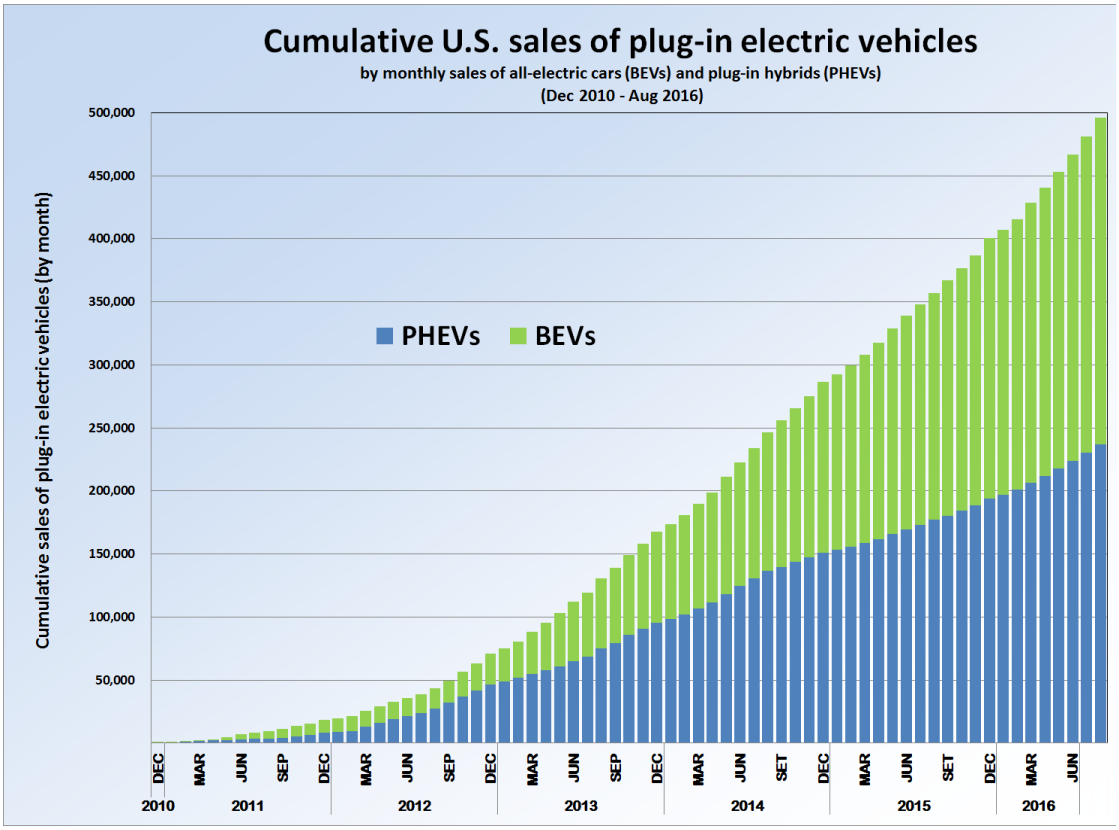

Fig 8: Above is a Cumulative U.S. sales chart of hybrid from 2010-2016. BEV-Battery Electric Vehicle & PHEV-Plugin Hybrid Electric Vehicle

Conclusion

After reading this article and being more informational than before, I recommend people to buy and use hybrid cars and see them as a better option and not to criticise but to encourage others to buy them since they are the best option for urban usage and have better market than electric vehicles and will definitely prove to be the best in all aspects as the science continues to expand its reach.Using hybrids will also result in reduction in usage of fossil fuels to major extent, thus leading to global sustainable development in shorter span of time. The government must also provide aid wherever necessary so that affordabilty and availability can go hand-in-hand. Hence hybrids will surely be the exquisite choice for the future.

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