Electric vehicle comparison, Profitability of gas pipeline

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Abstract
As India is a developing country. To achieve the success rate more, EV and Pipeline concept come into account. To being with an ultimate goal of any organization is to maximize the profit and to minimize the overall Production cost. It can only be done if the company work effectively and efficiently to taste the success ratio. If we compare an EV concept with Gas Pipeline, there is no. of reasons for both. Environmental focus, less operational and maintenance activities. To deal with Gas Pipeline and EVs current scenario of India as come into extent.

Keywords: Electric Vehicle (EVs), Gas Pipeline, Construction, Transportation.

Introduction
Electric Vehicle
In India, the automobile industry is the key player for economic growth. It should be noted that 2020s next generation will be the decade of the electric car. Theory showed that Electric vehicles are cleaner than petroleum-fuelled vehicles. Try show an impact of energy crisis and future of EVs in India. It should be noted that to save the price of fuel, EV are the India's future transportation system. To achieve this, strategies as to be follow.
Therefore, the three key strategies are:

a. Cutting down carbon emissions
b. Creating new job opportunities
c. Reducing use of crude oil

According to a research, 90 per cent of India's car owners would willingly switch to electric cars. EV operating cost/Km is lower. Charging EV is convenient can be filled up at home and work. Electric cars have low maintenance requirements.

Government initiatives
Under National Electric Mobility Mission Plan 2020, Indian government aims to see 6 million electric and hybrid vehicles on the roads. To implement this, government is trying to target smart cities to boost the growth of EV.

International practice
Till now country like Norway, China, US, UK and France are using 100% EVs.

Profitability of Gas Pipeline
In gas industry Pipelines plays an important role. They linked between supply and demand centres, economics are a key player to defining the importance of development of gas project. For the transportation of gas containing large quantities, pipelines are the only source. Due to some safety point of view, pipeline transportation only guarantees the protection for the environment. Also, there is no other pollution or disturbance or traffic handling. There is a continuous gas supply to refineries in a safety way by eliminating conditions such as weather. Although, for most economical reasons pipeline system installation requires high investment. Best efficient way of operation of a pipeline system should be constant supply of flow rate. Due to market requirement there should be a seasonal fluctuations, for the continuous supply to the refineries. It should be noted that shutdown occurs due to the following two reasons, firstly maintenance of a pipeline system are required and secondly if the operational safety limits exceeds the pipeline must be shutdown automatically. These shutdowns operation are not expected to last longer than 3-4 day.

Literature review
According to Megan Hansen, Ethan Dustier, for economic reason environmental safety as to be taken into consideration for transporting oil & gas. The Hindus Business Line published article (2019) working on CNG, PNG Infrastructure in 50 places, focusing on Compressed Natural Gas and Petroleum Natural Gas. The published article (2017) by Pipeline Association for Public Awareness, an organization for pipeline safety. According to Bill Brooks' bank, Mohan Thiagarajah (2000) working for pipeline simulation group to increase the Profitability of Pipeline Operations. A review by Dr. Ramprasad on HVJ Pipeline, biggest pipeline in India.

Methodology
The study of Comparing Electric Vehicle with Gas Pipeline. In this study, EV maintenance cost, Petroleum Planning Analysis Cell (PPAC), CNG stations and vehicles, PNG Connections have done.

Description
Electric vehicles maintenance cost
The study of EV maintenance cost, by servicing vehicles. It can be compare by the vehicle drive in Distance, Months after service, free service or paid service, total cost of maintenance requirement.

Table 1: Electric Vehicles Maintenance Cost

Servicing	Distance(Km-s)	Months	Free/Paid	Total Price (Rs.)
1	5000	6	Free	896
2	10000	12	Free	896
3	20000	24	Paid	4119
4	30000	36	Paid	2386
5	40000	48	Paid	4924
6	50000	60	Paid	2386
7	60000	72	Paid	4119
8	70000	84	Paid	2386
9	80000	96	Paid	5164
10	90000	108	Paid	2386
11	100000	120	Paid	4029

According to Petroleum Planning Analysis Cell (PPAC)

According to the study of PPAC, the state wise study of different companies in last five years.

Table 2: CNG Sales in TMT

CNG Sales							
State	**Company Name**	**No of Companies as on 01-04-2019**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Andhra Pradesh	BGL	3	26	27	29	32	31
Chandigarh	IO-AGPL	1	-	-	0	5	15
Delhi	IGL	1	717	738	804	1016	1144
Gujarat	GGL	7	476	503	546	612	662
Haryana	Gail G L	5	72	75	109	144	179
Karnataka	Gail G L	2	-	-	0	0	0.3
Kerala	IO-AGPL	1	-	-	-	0	1
Madhya Pradesh	Gail G L	2	17	19	22	25	31
Maharashtra	MGL	5	531	565	593	630	702
Odisha	GAIL	1	-	-	-	0	1
Punjab	GSPL	2	-	-	-	-	1
Rajasthan	RSGL	1	3	4	4	5	7
Tripura	TNGL	1	10	11	12	13	15
Uttar Pradesh	C.UP GL	9	185	212	245	153	282
Uttarakhand	IO-AGPL	1	-	-	-	-	0.1
West Bengal	GEECL	1	1	1	2	2	3
Total			**2037**	**2155**	**2365**	**2637**	**3074**

CNG Station and Vehicles as on 01-04-2019

The study of No of CNG Stations and No of Vehicles of different states and different companies.

Table 3: No of CNG Stations and Vehicles

State	Company Name	No of CNG Stations	No of CNG Vehicles
Andhra Pradesh	BGL	44	19794
Bihar	IO-AGPL	2	0
Chandigarh	IGL	5	7500
Delhi	GGL	482	1065603
Gujarat	Gail G L	548	925286
Haryana	Gail G L	66	159783
Karnataka	IO-AGPL	13	1093
Kerala	Gail G L	4	900
Madhya Pradesh	MGL	43	35996
Maharashtra	GAIL	313	922439
Odisha	GSPL	6	2640
Punjab	RSGL	6	2202
Rajasthan	BGL	5	8438
Telangana	IO-AGPL	45	24980
Tripura	IGL	9	11688
Uttar Pradesh	C.UP GL	128	154091
Uttarakhand	IO-AGPL	1	100
West Bengal	GEECL	7	3756
India		**1627**	**3346289**

PNG Connections

The study of No of PNG Connections for different states and for different companies. The connections are Domestic, Commercial and Industrial.

Table 4: No of PNG Connections

State	CGD Companies	Domestic Connection	Commercial Connection	Industrial Connection
Delhi	BGL	1092223	2561	1751
Maharashtra	IO-AGPL	1452902	4064	260
Gujarat	IGL	2041557	18719	4897
Uttar Pradesh	GGL	157503	495	651
Tripura	Gail G L	39743	415	49
Madhya Pradesh	Gail G L	56110	133	189
Rajasthan	IO-AGPL	2160	12	14
Assam	Gail G L	32469	1074	402
Andhra Pradesh	MGL	29435	120	4
Haryana	GAIL	98893	281	486
Karnataka	GSPL	16860	124	75
Chandigarh	BGL	9598	0	1
Kerala	IO-AGPL	1032	10	1
Odisha	IGL	225	0	0
Punjab	RSGL	400	1	11
Telangana	IO-AGPL	10579	12	17
Uttarakhand	IO-AGPL	993	3	6
Total		**5042682**	**28024**	**8814**

Discussion

There are six major gas pipelines in India i.e. Naharkatia-Nunmati-Barauni Pipeline, Mumbai High-Mumbai-Ankleshwar-Kayoli Pipeline, Salaya-Koyali-Mathura Pipeline, Hajira-Vijapur-Jagdishpur (HBJ) Gas Pipeline, Jamnagar-Loni LPG Pipeline, Kandla-Bhatinda Pipeline.

Hazira-Vijaipur-Jagdishpur (HVJ) Gas Pipeline

Associated gas comes out with oil. The quantity of gas dissolved depends upon the saturated pressure of the reservoir. Commonly about 500 SCF dissolves in a barrel of oil under a pressure of 2500 psi. When the production of oil has to be stepped up naturally the associated gas quantum also increases. During the initial stages of Bombay High development there were no infrastructure facilities to consume the gas hence it was flared. During 2000-10 the quantum of gas flared was enormous. About two decades back gas was ranked second to oil, but today the thinking has changed. Right from the boiler fuel to petrochemical feedstock and a clean fuel for automobiles, the utility and serviceability of gas has brought increase its credibility to No.1 fuel. Today Gas refinery is a reality. The enhanced gas consumption during the last decade and ever increasing demand is a real meter to show how it is being regarded as the most important material in daily life. GOI has started looking for Hydrocarbon deposits throughout the country. The results of which were significant. KG basins discovery in the late 90s brought significant change in the hydrocarbon activities in this region.

To successfully utilise the enormous amount of associated gas from Bombay High, a gas processing plant at Hazira was commissioned and this sweetened gas is transported through a pipeline. The length of this pipeline was 1700 Km; presently it is 2300 Km long and in the second phase was able to transport 20 MMCMD gas. The gas is supplied to ten fertilizer plants and power house for generation of 4000 MW besides to a gas cracker plant at Gandhar and to IPCL. With branch line drawn up to Kanpur, Faridabad and Salimpur petrochemical complex can transport 33 MMMD of gas.

KG basin is the next biggest Off-Shore activity in India, approximately reserves are 7 trillion CM, with the entrance of Reliance Industries with the partnership of Niko Resources of Canada into this basin remarkable achievements were attained. With the success in Gas discovery in M-1 and H-1 wells it has plans to produce 45 MMCMD of gas. Presently 60,000 to one lakh cu.meters of gas is being supplied to power house in Kovvur 80 KM away from KG basin and other gas consumers. The future of gas is secure in KG basin and will provide gas to Nagarjuna Fertilisers and other gas based power houses when the production reaches one million cu.meters.

HVJ Pipeline project was conceived in year 82. This pipeline of 1758 Km long at a cost of 1760 cores of rupees is capable of transporting 30 million cu. Meters of gas at peak demands. Presently, the gas production of Bombay High South Basin and satellite platforms to 26 cu. meters a day, the present processing capacity of Hazira terminal, which in two or three years will touch a new high mark of 50 m2 CMD.

Functions

Pipelines can be classified as, Gathering, Transportation, Distribution Pipelines.

Development and Planning
The construction of Pipeline project covers civil engineering works. Follow the principle of EPCC (Engineering, Procurement, Construction and Commissioning).

Operation
The SCADA System for pipelines.

Technology
Implementation
Pipelines are generally laid underground.

Maintenance
Maintenance of Pipeline as to be done.

Determination of Gas Pipeline (Cost/Mile)
Multiplying the distance of the pipe by the diameter of the pipe.

Other Factors that dictate the cost of constructing a Gas Pipeline
1. Materials and Labours
2. Professional Services
3. Nature's Challenges

Challenges for EVs
EV market currently at lowest level in the world. To contribute effectively, focus on two wheelers because two wheelers account 76% of the vehicles in the country.
1. Capital costs are high.
2. Affordability of EVs.
3. The Faster Adoption and Manufacturing of EVs.
4. Lack of Attention.
5. Initial Investment.
6. Repairing and Maintenance options are not possible.

Advantages and disadvantages of gas pipeline transportation
Following are the Advantages and Disadvantages of Gas Pipeline Transportation

Advantages
1. A unique mode of Transportation.
2. Low Operating costs.
3. Safe to operate versus other forms of Transportation.
4. Moving large quantities over long distances.
5. Local Network flexibility.
6. Suitable for all weather.
7. Low Energy consumption.

Disadvantages
1. High initial investment cost in construction.
2. High fix costs.
3. Slow process.
4. Inflexible.
5. Leakages.

Conclusion
Electric Vehicle
We conclude that,
1. EVs are more environmentally friendly than Fuel based vehicles.
2. Batteries have a long life.
3. Battery recycling system available.

Gas Pipeline
We conclude that, It is not easy to shut down the operation of pipeline engineering. As EV market will start in future and Oil & Gas market are currently demanding sector. Without the use of fuel the international market will not grow. So, to consider the current scenario there as to be a Profitability of gas pipeline.

Future Implication
1. Digital Pipelines 4.0 to boost Oil and Gas Pipeline Safety and Efficiency to the next level.
2. Advanced Tools For Improving the Profitability of Pipeline Operations.
3. Maximize Pipeline Safety and Efficiency with Analytics and Decision Support Tools.
4. Improve pipeline performance and integrity with real-time insights and analytics.
5. Allow better collaboration and visualization by centralizing asset performance data.
6. Improve workforce productivity while reducing safety risks, operation and maintenance costs.

Source of Funding
None.

Conflicts of Interest
None.

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