

Market Driven Model for Promotion of CNG as Transportation Fuel in Developing Countries: Learning from a Successful Initiative in India

Thilotham R. Kolanu^{1,*} and Uma B. Kondury²

¹Faculty & Area Chairman, Administrative Staff College of India (ASCI), Bella Vista, Hyderabad, India

²Research Fellow, Centre for Energy, Environment, Urban Governance and Infrastructure Development, ASCI, Hyderabad, India

*Author to whom correspondence should be addressed, email: trkolanu@yahoo.com

Abstract: There is has been considerable international attention towards adoption of alternative fuels for transport sector so as to diversify the mix of the fuels and improve air quality especially in urban areas. Given cost and environmental advantages attached with natural gas various city, state and federal governments have been opting it as an alternative transportation fuel. Market development of natural gas as transportation fuel has been pushed through various policy instruments such as regulatory mandates, fiscal incentives, capacity and awareness building initiatives including R & D activities. There have been limited market-driven approaches and models for promotion of natural gas as a transportation fuel especially in urban areas of developing countries. Promotion of Compressed Natural Gas as a transportation fuel in certain urban areas of Gujarat State in India has been purely based on market based model unlike in other cities like Delhi, Mumbai etc which is seen a successful initiative. In this context, it is important to understand the various dimensions of this model so as to distill learning of similar initiatives towards adoption of alternative fuels in transport sector. This paper gives the contextual background to the transport and environmental scenario of Surat city (Gujarat State) in India wherein an established natural gas supplying firm like Gujarat Gas Company Ltd (GGCL) has achieved success in changing the fuel usage patterns for large number of private vehicles and consequently contributing towards improvements in urban air quality of the city. It focuses on the strategies used by GGCL to promote CNG as transportation fuel by fostering a partnership approach wherein critical stakeholders have been constantly engaged for understanding their perspective and addressing the identified gaps. It analyses the manner in which GGCL developed strong association with critical stakeholders such as conversion kit manufacturers, financiers, *retrofitters and regulatory* authorities. The step-by- step approach adopted by GGCL in realizing the objective of CNG penetration as transport fuel in Surat starting from idea generation, conceptualization, initial market survey, development of business proposal, generation of strategic plan to implementation of plan. The contours of the business model used by the firm are detailed for understanding the criticality of the linkages that are essential for alternative fuel market development. The manner in which both push and pull strategies have been systematically deployed by the firm both by leveraging its existing brand value as well as simultaneously building it further for consolidation and higher market penetration. In

2005, more than 16000 vehicles got converted to CNG as against 1591 in 2003 and 5128 in 2004. The average daily sales also climbed from 3425 SCMD in 2003 to 82072 SCMD in 2005. By the end of January 2006, the total sales in Surat, Bharuch and Ankaleshwar increased to 3223266 SCMD. From pollution perspective it was reported that there has been a reduction in emissions by 80 tons/day. It concludes by presenting the key learning for providing a way forward to other city, state and federal governments and private sector players especially in developing countries like India.

Keywords: Alternative Fuels, CNG, Transport Sector, Market based, Stakeholder Partnerships, Developing Countries, India

Introduction

Air quality in most urban areas is a cause of serious concern world wide today. Increased urbanization and raising living standards are leading to manifold increase in the motorization thereby contributing to problem of enhanced levels of vehicular emissions and the attendant air pollution. The number of vehicles in India has more than doubled during the last ten years; corresponding to this, the average pollution levels in many cities across the country has increased at an alarming rate of 8 % per annum [1]. In India there has been an increase in the total production of all vehicles from 2003 to 2004 (including commercial and multi utility vehicles) by over 15 % [2]. Owing to these reasons, there has been a felt need for adoption of cleaner fuels with similar or better performance levels to conventional fuels like diesel and petrol. Compressed Natural Gas (CNG), identified as one such alternative fuel, has been found to be effective to meet the ever-growing demands of transport vehicles.

Usage of CNG in transport vehicles in India dates back to 1995 when there was a proposition to introduce CNG in public transport vehicles in the national capital region (NCR) of Delhi, world's 5th most polluted city. While this option of CNG is deliberated, the Supreme Court of India in 1998 intervened into the matter and gave a ruling that vehicles older than 15 years cannot ply on the Delhi roads. Further, it gave a verdict that only CNG is to be used in public transport buses running in NCR. By the end of 2002 most of the public transport buses in Delhi have been converted to CNG. Currently, the world's largest fleet of CNG buses is operating in Delhi. Taking the experience of Delhi as an example, many other highly polluted cities like Mumbai and Chennai also started following suit. This case study focuses on how CNG has been introduced in Gujarat by Gujarat Gas Company Limited (GGCL), a private sector gas production and distribution Company. The experience of GGCL is in contrast to that in Delhi where judicial intervention and regulatory command played the lead role. The case study focuses on the evolution of company strategy in promotion of CNG as transportation fuel and its impact on the market. Evolution of company's strategies focuses on the shortcomings of the earlier approach, impetus to new focused approach and its various elements including marketing campaigns launched, strategic tieups established, business model adopted and challenges faced. It brings forth how GGCL managed to draw partnership among major players so as to enable penetration of CNG as transport fuel. This case highlights the point that it is highly essential to gather the support of allied groups / working partners for the successful launch of a programme .GGCL's success story is a perfect example of how it makes good business sense for companies to seek the support of allied industries in situations where a good number of players dictate the rules of the game. The case also indicates that adopting a good business model brings in a win-win situation for companies, customers and other interest groups

CNG Introduction in Gujarat

Gujarat Gas Company Limited (GGCL) launched the first CNG station in India in Surat in the year 1992. Two other daughter stations were also commissioned one in the year 1995 and subsequently in 1996. Gujarat Gas tried to push up the sales of CNG by using various financial incentive mechanisms. GGCL financed the CNG conversion kit apart from heavily subsidizing it. Despite these efforts to launch CNG successfully in Gujarat the company couldn't achieve enough conversions; eventually resulted in poor sales of CNG. This led forceful termination of one of its daughter stations in the year 2003. There was a common (mis) perception amongst the users and other groups that CNG doesn't support business and its usage in the transport sector could be made viable only through legislation and regulation. Hence, the company did not give attention to marketing and other related activities to boost sales as far as CNG is concerned. This apart, safety issues, lack of CNG refueling stations and high conversion costs acted as hindrances in switching over from conventional fuels to CNG powered vehicles. There was prevailing perception amongst users that CNG is not safe in vehicles, as they are required to be stored in cylinders under very high-pressure conditions (approximately 220 bar). Shortage of infrastructural facilities did not motivate enough vehicle owners to switch to CNG. All these factors resulted in low CNG sales and consequently wiped out the possibility of CNG being used as alternative fuel in vehicles from the minds of consumers.

Approach

The re-launch

In March 2004, the company decided to re launch its CNG operations with intensified marketing efforts, establishment of infrastructure like CNG distribution stations and focus on high conversion rate. There was constant support from the corporate office at all stages of the re-launch like planning, co-ordination and execution. This time, the company came out with a different strategic approach by reworking its business model, marketing and financial efforts. The company realized that increased market development activities like educating the customers and building awareness amongst them are some of the ways and means to obliterate out the common misconception. It also realized that there is a strong need for close association of allied stakeholders including conversion kit manufacturers, financiers, retrofitters and regulatory authorities to enable easy switch over to CNG as a transport fuel. As a part of infrastructure building, it added five more CNG stations in a span of five months during the year 2004. GGCL adopted a step-by- step approach in realizing the objective of CNG penetration as transport fuel in Surat. The methodology followed involved idea generation, conceptualization, initial market survey, development of business proposal, generation of strategic plan and implementation of plan. With the successful adoption of CNG as transportation fuel both in Delhi and Mumbai it was perceived to be relatively easy to capture part of the transportation fuel market in selected cities owing to the positive financial gains for end users provided all the linkages in supply chain are addressed appropriately. Given this understanding of the top management it intended to evaluate market opportunity through deployment of a focused internal team. Market survey method was used to assess the initial market situations, potential opportunities and challenges. With inputs from market survey reports a feasible business plan was developed. It was realized in the initial stages itself that unless a senior manager leads the business development unit created for promotion of CNG, the required strategic direction couldn't be achieved. Hence a senior manager was deployed for taking up the challenging task of ensuring implementation of strategic business plan. A marketing plan that was in line with the business plan was evolved.

Initial market survey

The company undertook an initial survey on petrol driven auto rickshaws and cars in Surat, Ankaleshwar and Bharuch. The main objective of this study was to evaluate potential customers in these regions and to assess their awareness levels about usage patterns and benefits of CNG as a transport fuel. As an initial step, data was collected from regional RTOs, authorized dealers for petrol driven cars and auto rickshaw associations. It was learnt that the total auto rickshaw population in these three cities put together was around 52337. Surat had about 41093 autos while Bharuch and Ankaleshwar had 11244. With the help of a well-drafted questionnaire, it was found that the average petrol consumption was about 3-5 lt. per day. Auto rickshaw drivers also informed that petrol gives an average mileage of 30-35 km/lt. The average income per day for a petrol driven auto rickshaw amounted to Rs 60- 250/-. Given the same average distance covered per day the company calculated that average income using CNG as fuel would range from Rs. 100 to 400 /- Further research revealed that most drivers are unwilling to spend Rs 18,000/- for switching to CNG and that Rs 10,000/- would be affordable. Investigations on capital investment indicated that as much as 95% of the auto rickshaw owners required loan facility to enable conversions. Prevalence of unauthorized conversion kits in the market has also been brought out in this initial review. Taking inputs from this market survey, GGCL observed that price economics of CNG compared to petrol would be a driving force for conversions and that most auto rickshaw owners were willing to make the switch. Given this understanding of market dynamics, the company arrived at conclusions that there is a strong need for initial financing mechanism to support conversions. Close partnership with conversion kit manufacturers is needed to not only draw their interest but also to assist them in improving their business. Thus a business model, which would address these issues, was developed.

Strategy

GGCL applied a combination of pull and push strategy to effect conversions to CNG fueled vehicles. Pull strategy focused on aggressive marketing campaigns and promotional activities. It included intensified road shows concentrating on the economical benefits of CNG along with awareness and education programmes focusing upon the misconceptions on safety aspects with respect to CNG as a vehicle fuel. The awareness programmes comprised of advertisement in newspapers (media), hoardings at various locations, distribution of leaflets, establishment of CNG kiosks, loan melas (loan fairs) and road shows. The push strategy included direct marketing efforts of other interest groups. All the stakeholders such as kit suppliers, retrofitters, financiers, regulatory bodies, franchisees have been brought on one platform by GGCL. Direct marketing by these groups slowly increased conversions to CNG. Ready availability of kits, prompt retrofitment services, initial financial support from the financial institutions prompted many auto rickshaw owners to consider a switch to CNG. It is important to emphasize at this juncture the critical role played by GGCL brand in not only bringing together different players in the supply chain but also in ensuring actualization of the commitments extended. Thus GGCL effectively leveraged its brand image for enabling investments from individual franchisee and financial institutions to retrofitters and vehicle owners. Thus, the push strategy also paved way for conversions. The company led by effective branding developed high visibility and soon caught the eye of many a user. GGCL's strategy is represented in Fig 1.

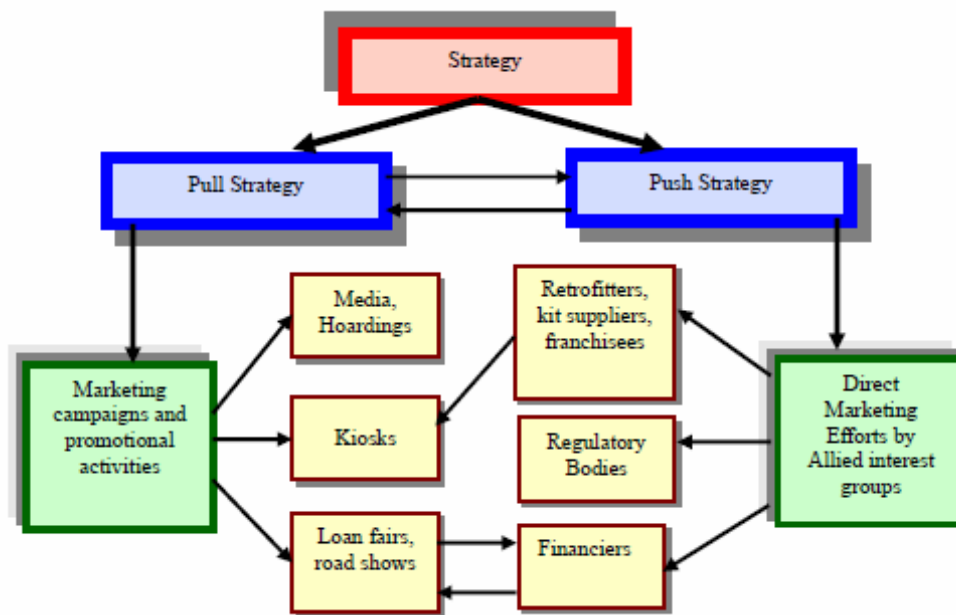


Fig 1 The Strategy Adopted for Promotion of CNG as Transportation Fuel

Results and Discussion

The vigorous awareness campaigns initiated by GGCL revolved around the most critical success factor for the implementation of CNG viz. price economics. The price of a kg of CNG was fixed at Rs. 22.55/- whereas a litre of petrol was as high as Rs. 47.44/- (as on 31 December 2005 in Surat, Source: GGCL). Auto LPG was priced at around Rs 30.20/-. The operating cost of CNG and petrol worked out to Rs. 1.1/km and Rs 3.6/ km respectively while the unit operating cost of Auto LPG was Rs 2.32/km. This indicates that the mileage in kms per unit of fuel is highest in case of CNG followed by LPG. Petrol is said to give the least mileage in kms/unit fuel. This analysis clearly indicates that for a given distance traveled the cost per km is least in case of CNG and highest in case of Petrol. This price economics was perceived to make better economical sense to the car owners (Table No: 1). As the average running distance for auto rickshaws being higher in comparison to 4 wheelers, the annual savings was much higher and hence the payback period was less than a year (about 5-7 months). This prompted auto rickshaw drivers to opt for a CNG conversion. Added to this, another common myth about CNG was that it required high maintenance costs. GGCL had to once again clarify that CNG being a gaseous fuel improves the combustion process by mixing thoroughly with air thereby improving engine life and reducing maintenance costs. Thus CNG as a vehicular fuel became popular amongst 3 and 4 wheelers; gradual conversions to CNG result in.

Business model

In order to implement its strategy, the first and foremost task of the company was to use its own brand image. Effective brand management helped the company to bring kit manufacturers, financiers, franchisees, retrofitters, dealers/distributors and other key stakeholders together on one single platform. Figure 3 indicates the brand image of Gujarat gas CNG.

Table 1 Price economics of CNG for 4 wheelers

Type of vehicle	4 Wheelers (Cars)			
	Fuel	CNG	PETROL	AUTO LPG
Measuring Unit	Kg	Ltr	Ltr	Ltr
Fuel cost in Rs per Unit*	22.55	47.44	31.49	31.49
Mileage - Kms/ Unit of fuel	21	15	13	13
Operating cost in Rs/Km	1.07	3.16	2.42	2.42
Average Vehicle Running / Day- KMS	35	35	35	35
Operating cost Rs/day	38	111	85	85
Saving / Day (Compared to Petrol) (Rs./day)	73		26	26
Approx. Conversion cost -- Carburetor Vehicle (Rs.)	34000		15000	15000
Approx. Conversion Cost- MPFI Vehicle (Rs.)	38000		20000	20000
Pay back period by using CNG (in months)- For Carburetor vehicle	15		19	19
Pay back period by using CNG (in months)- For MPFI vehicle	17		25	25
* CNG price is of GGCL, Petrol/Diesel price is of Rs. 47.44/34.91 per litre in Surat, AutoLPG price is Rs.31.49 per litre in Surat as on Feb 06, 2006. Source: GGCL				

Franchisees – the company invited prominent businessmen who owned land at prime locations in Surat and discussed business development. It signed an agreement with these landowners to develop their land with civil infrastructure. The company once again took charge of persuading franchisees to invest in land procurement and infrastructure development by clarifying that the company itself was involved in huge capital investment on CNG infrastructure like compressors, storage systems and filling systems etc. While the cost of establishing civil infrastructure for each retail outlet is approximately Rs 50, 00, 000/-, the cost of establishing CNG infrastructure for the company amounted to as much as Rs. 2.5-3.0 Crores. This argument convinced franchisees and prompted them to develop the required infrastructure. Apart from land and civil work, franchisees are responsible for forecourt operation in which major cost is manpower cost. GGCL pays Rs. 1 per Kg of CNG sold at the end of every month. Alliance with franchisees for retail outlet lessened the capital expenditure for GGCL, involved more number of players thus widening its presence. Low operating cost, establishment of outlets at strategic locations, low non-value added costs etc were some other advantages that the company gained with this arrangement.

Regulatory Authorities – The next task of seeking necessary approvals required union with regulatory authorities like RTOs. The regulatory bodies were convinced about the potential positive environmental benefits of using CNG in vehicles. Conversion kits – In India, Automotive Regulatory Authority of India (ARAI) and Vehicles Research and Development Establishment (VRDE) test CNG kits for safety. Only vehicles fitted with kits approved by ARAI/VRDE were supplied with gas at GGCL's retail outlets. Apart from this, GGCL established standards such as filling gas in only those vehicles that were fitted in approved garages. It also undertook the responsibility of ensuring that all

the cylinders getting filled at GGCL stations were within the test life. GGCL's business model for CNG is depicted in Fig 2

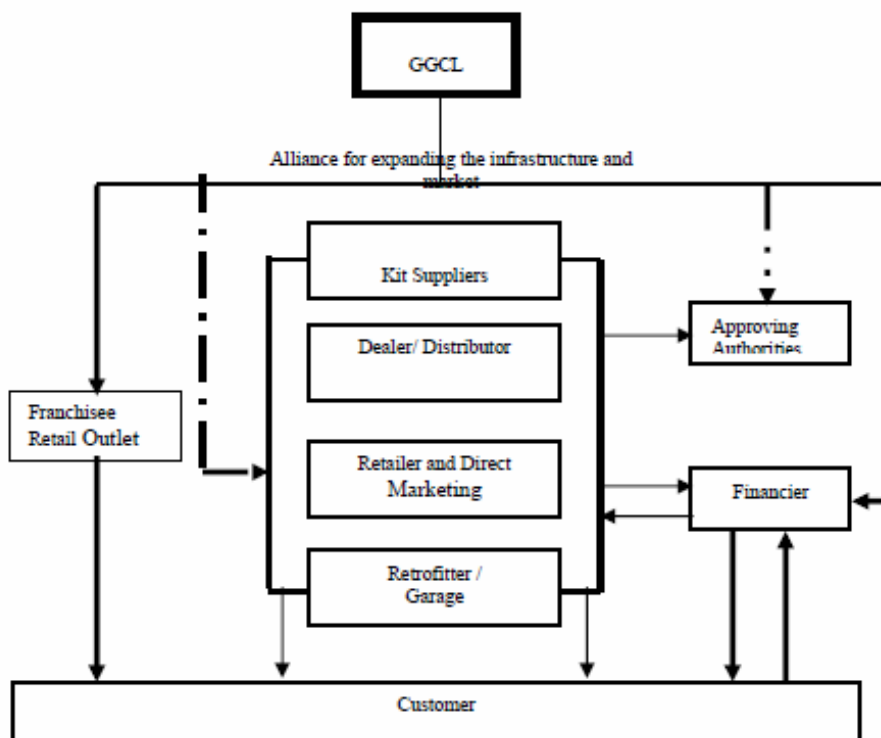


Fig. 2 GGCL Business Model for CNG

Financing – GGCL approached the local funding agencies that were in a position to fund auto rickshaws readily. This benefited vehicle owners, as it eliminated huge paper work, thus enabling easy loans paving way for quick conversions. The company's effective brand image acted as a driving force for the local funding sources to work in association with it. With the help of effective brand management, GGCL created a network comprising of nine kit suppliers, fourteen kit distributors, thirty financiers, forty retrofitters, ninety direct marketing individuals and retrofitters with total capacity of retrofitting 3000 vehicles per month. It increased its retail outlets from 7 in December 2004 to 13 by the end of 2005. Thus GGCL could effectively bring out a sense of common profitability by involving all the stakeholders in the industry. There was a tremendous response from the market.

Response

Gujarat gas's pull and push strategy worked out brilliantly. The overwhelming initial response resulted in further conversions. In 2005, more than 16000 vehicles got converted to CNG as against 1591 in 2003 and 5128 in 2004. The average daily sales also climbed from 3425 SCMD in 2003 to 82072 SCMD in 2005. By the end of January 2006, the total sales in Surat, Bharuch and Ankaleshwar increased to 3223266 SCMD. From pollution perspective it was reported that there has been a reduction in emissions by 80 tons/day.

Challenges faced

The next challenge faced by GGCL was to maintain the exponential market growth and also meeting the expectations of customers, business associates and policy makers. A CNG Team comprising of informal group of members was formed and was made responsible for encountering these challenges and ensuring smoother business. This team worked in association with franchisees and kit

manufacturers for meeting these challenges. The various challenges faced by the company are categorized as under:

Project management

Delivery of fuel in shortest possible time – in order to ensure smoother delivery of fuel in short span of time, the company appointed an external agency called CNG station franchisee. This is under the purview of franchisees as they are responsible for all direct construction activities, which is a time consuming process. Franchisees took self-interest to complete civil construction within shortest possible time as delay in this would result in huge losses to them. Maintaining high safety standards – the project management also involved maintaining high safety and quality standards. This was a Herculean task for the company since standards had to be monitored at multiple locations simultaneously as CNG sales gained momentum.

Managing market

Ensuring faster fill in stations – as the number of vehicles converted to CNG increased, the need for refueling also increased. The number of stations established was much less in comparison to demand for refueling. This resulted in long waiting time at the refueling stations annoying the users. At times, the average length of queue was as much as 2 kms making the average waiting time to 3 hrs. It was a challenge to the team to prevent any re-conversions. Supplying adequate CNG kits – this challenge encompasses ensuring timely supply of kits needed for conversion. It also included developing coordination with the kit suppliers as well as funding agencies to ensure smoother supply chain network. Convincing customers on long waiting time at stations – as mentioned in the preceding paragraph, longer waiting time for refueling infuriated users. Pacifying the users, auto unions, media and local administration was another area of concern.

Managing CNG stations

Maintaining discipline at filling stations – the team along with support of local policemen was assigned with the responsibility of maintaining order in the filling stations. Ensuring safety precautions and safety guidelines – as the CNG stations operated under high pressures the teams task was to guarantee safety stipulations to prevent any mishaps. The CNG team designed to meet these challenges was in turn classified under three groups with same names- Marketing, Projects and Station Management. Key Result Areas (KRAs) under each category were worked out which were in line with the above challenges. A detailed plan of action was prepared enlisting various critical activities. Harmony, co-ordination and team work were the pillars of this action plan. Management Information Systems (MIS) and reporting cards were used to achieve coordination amongst the teams along with both formal and informal discussions and meetings. Some of the key actions of the teams are put forth.

Project team

Franchisees were briefed about the benefits of keeping track of fuel delivery in stations and were made to cut down any activity, which meant an additional cost. The team was constantly in association with franchisees' subcontractors. The team was proactive in deciding the franchisees' selection of vendors, project execution and timely delivery of critical items. This proved to be an efficient tool in maintaining trouble-free stations for the franchisees. The franchisees and subcontractors were provided with information on the company's safety and quality standards. This not only prevented stoppage of work due to non-compliance but also served in clearly stating out GGCL's quality standards to its franchisees.

Marketing team

The marketing acted as a channel of communication between the company and its associates. It was involved in interacting with the kit suppliers, retrofitters, financiers, existing and prospective customers

and other opinion leaders. Company's plans of establishing new stations were regularly communicated to all the above-mentioned business partners. This helped them to deliver products and services in an effective and timely fashion. The team observed that supply of conversion kits played a crucial role in maintaining pace of conversion. It was constantly in communication with kit suppliers who were briefed about conversion plan on monthly basis. This helped the suppliers to produce optimum number of kits and meet the demand. The company sought the support of government in timely creation of required infrastructure to meet the growing demand. Various government officials at the local level including RTO, police commissioner, district collector and municipal commissioner were regularly informed about developments in CNG as a transport fuel. The team's other marketing activities included convincing customers to refill their vehicles in less occupied stations. To facilitate this, the franchisees were suggested to offer incentives during lean hours. This only ensured uniform demand at all stations but also resulted in maximum capacity utilization.

Station management team

This team was involved in providing the required training to its franchisees and its staff on management of customers and queues. It was actively involved in getting a work-study conducted by an external agency. The study suggested ways and means to reduce the service time. This benefited the franchisees in utilizing their stations optimally.

Future opportunities

GGCL is planning to add 10 more filling stations in Surat. Further, it is contemplating to expand its network to other cities in Gujarat including Vapi. The state of Gujarat enjoys a locational advantage of proximity to LNG terminal at Dahej apart from existence of huge number of natural gas consumers in power, fertilizers, petrochemicals, steel and transport sectors. GGCL by leveraging this advantage created its own network of various stakeholders in the CNG industry and thus, brought workable business models to exploit current business opportunities and enter new markets.

Conclusion

This case study demonstrates that for promotion of alternative fuels for transport sector in the developing countries apart from the command and control approach i.e, a top down approach there are alternative market driven models that can be evolved based on contextual specificities. This requires long-term vision with business model that address concerns of all the major stakeholders evolved in a partnership approach. Such a model not only becomes financially viable but also sustainable in the long run. But it requires appropriate market conditions and deployment of marketing and communication strategies that are facilitated by the governments.

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