Liquefied Natural Gas Vehicle

A clean alternative for heavy-duty applications

to summarize…

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- LNG, as one of alternative fuels, has developed for heavy-duty applications.
- In China, the car-used LNG market is likely to warm up with big names behind. 1,000+ LNG vehicles have been put into operation in Xinjiang.
- A major incentive to use LNG is its potential in reduction of fuel cost. According to our estimates, a 50 tonnage LNG truck can save ~RMB75,000 each year compared with a diesel one.
- Maintenance and gas refilling are the two major drawbacks for application of LNG vehicles. To minimize their impact, places with frequent short-distance transportation demand should be firstly consider.
- Investment opportunity arose in three sectors: whole cars and components, production of natural gas and gas refilling. The prior two, entry barriers are relatively high. Small & middle-size companies may find their opportunities in the last.
- A LNG station can break even when number of daily car served exceeds 17. Nice profit is possible after the traffic increases. Three HK-listed companies have plans to step into this emerging market, including Kunlun Energy (0135 HK), Tianlun Gas (1600 HK) and Cosmopolitan (0120 HK).

A "forgotten" green energy solution. When electric car should be one of the most popular topics lately, alternative fuel concept drew much less attention, although it is also environmental friendly and has been widely developed. Common alternatives include compressed natural gas (CNG), liquefied natural gas (LNG) and liquefied petroleum gas (LPG). CNG and LPG have been adopted in some city buses and taxies. Meanwhile, LNG finds its place in heave-duty applications.

Table 1. Comparison of automobile fuels

	CNG	LNG	LPG	Gasoline	Diesel
Density (kg/l)	0.185	0.41-0.50	0.54	0.745	0.837
Energy content (mj/l)	9.3	20.7	23.3	32.1	35.8
BTU value (per gallon)	33.4m	74.3m	83.6m	115m	128m
Engine modification	Yes	Yes	Yes	No	No
Pressure (atmospheric pressure)	275	1	1.5	1	1
Insulation requirement	No	super insulation	No	No	No
Gas explosion risk	Low	Low	Medium	High	High
Size of storage tank	Large	Medium	Small	Small	Small
Spaciousness of vehicle	Poor	Medium	Rich	Rich	Rich
Expected usage	Larger vehicles	Larger vehicles	smaller vehicles	smaller vehicles	Larger vehicles

Source: compiled by SBI E2-Capita

Market seems to set off in China. Initial trial of LNG vehicles in China can be traced back to 1990s' but actual application kicked off only recently due to technical restrictions. A loose association, "the Strategic Alliance of New Energy Heavy Truck" ("中国新能源重卡战略联盟"), was formed in Dec 10. According to our channel check, there are five truck manufacturers released their LNG models. Guanghui Group (600256 CH), a major promoter of LNG vehicle, has completed 60+ LNG stations, mainly in Xinjiang province, and it estimated there were 1,000+ LNG trucks in use in 2010.

Rationality behind LNG car. For customers, a key motivation to choose LNG truck, other than its environmental friendly perspective, is at economy side, although LNG truck is RMB80,000-100,000 higher than conventional one. LNG's energy density is ~40% lower than which of gasoline or diesel. Under a 1/625 compression ratio (from gaseous state to liquid), each m^3 gaseous natural gas (or 1.6l LNG) is equivalent to one liter gasoline or diesel in terms of energy generation during burning. As natural gas is much cheaper, LNG vehicle brings obvious benefit in saving fuel cost. Chinese government sets car-used natural gas price at no less than 0.75 of #93 gasoline's price. Thus, a 50 tonnage truck can save ~RMB75,000 each year by employing LNG technology. In practice, the natural gas – diesel price gap is much larger (~40%) so that actual saving can be even larger, which should be sufficient to offset higher initial investment on cars.

Table 2. Comparison of conventional and LNG truck

		LNG truck	
	Conventional truck	LNG price @ 75% of #93 gasoline	LNG price @ current level
Fuel type	Diesel	Natural gas	Natural gas
Car cost (RMB '000)	450.0	550.0	550.0
Fuel consumption (per 100 km)	40 l	40 m^3	40 m^3
Fuel price	RMB7/l	RMB5.4/m^3	RMB4.2/m^3
Yearly travel distance (km '000)	125.0	125.0	125.0
Total fuel consumption	50,000 l	50,000 m^3	50,000 m^3
Total fuel cost (RMB)	350,000.0	270,000.0	210,000.0
LNG truck's fuel saving (RMB/year)	-	80,000.0	140,000.0

Source: SBI E2-Capital

Where for LNG application. Major obstacles, in our eyes, against mass application of LNG vehicles include:

- High initial investment – LNG truck is usually more expensive (RMB80,000-100,000) than a conventional one (equivalent amount for technical upgrade on existing diesel engine), which discourages potential clients at first impression, although the extra cost can be compensated by fuel saving later. This issue can be solved by market education.
- Lacking of sufficient maintenance support – so far, there are only few garages, which are capable to provide necessary maintenance service for LNG trucks. We believe this issue is critical.
- Lacking of LNG gas stations – this is another key issue to be resolved.

It takes time to train up qualified technicians and build up gas stations. In this early stage, we reckon an effective solution is to concentrate on selected areas, where LNG trucks can be frequently used for short-distance transportation, so that both maintenance and fuel needs can be centralized. Such areas, in our view, might include logistic hubs, industrial zones, mining sites, etc.

Arising investment opportunities. We buy the LNG truck story for its: 1) proven technology and economy behind; 2) environmental protection potential; 3) seeable push from multiple enterprises including giant SOEs. Direct investment opportunities from capital market's perspective include:

- Sales of whole cars and components – car manufacturers should be the first beneficiary after the market kicked off. According to our channel check, there are five LNG truck vendors in the market. The market can be protected by the relatively high technical barrier. Associate risk is medium, mainly from initial investment on R&D, production capacity as well as marketing.
- Production of natural gas – LNG car will certainly create extra demand for natural gas, though it can hardly transfer into extra sales for natural gas producers given the already stretched supply in China. However, we still classify natural gas producers as a potential beneficiary because: 1) the stronger demand the better chance to trigger natural gas re-pricing; 2) the incremental demand may enjoy different geographic distribution from existing ones (e.g. coastal area), which offers additional sales flexibility for natural gas producers to maximize their own interest.
- Natural gas refilling service – In China, a traditional gas station can generate Rmb1-10m net profit each year with initial capex at RMB5-10m. It is reasonable to assume LNG station enjoy similar potential in long term. However, we highlight associated uncertainty, which is the highest among the three groups of beneficiaries due to immaturity of LNG vehicle market and, thus, demand for LNG station. A thorough assessment of local demand and selection of site location is needed to manage and minimize the risk.

Table 3. List of involved companies

Companies	Ticker	Related description
Sales of whole cars and components		
China FAW Group	not listed	In Aug 2010, the company supplied 71 LNG bus in Changsha, and there was order to supply another 110 LNG bus by end of 2010.
Dongfeng Group	489 HK	Back in Shanghai exhibition in 2009, the company has already introduced its LNG vehicles. The truck demonstrated targets short-range transportation, according to the management.
Sinotruk	3808 HK	In Nov 2010, the company indicated it succeeded in developing CNG and LNG vehicles. 19 models new energy vehicles are ready for sales upon approval by MIIT.
Shaanxi Auto	not listed	According to market news, the company agreed to work with local government in Yulin, Shaanxi (陕西榆林) to establish a production base of 50,000 units NGVs capacity in Oct 2010. At the same time, the company seeks to invest in infrastructure that serves 30,000 units NGVs, including logistics centre and LNG re-filling stations.
Beiqi Foton	600166 CH	The company announced that it succeeded in building LNG trucks in Dec 2010. At the same time, the company subsidiaries of PetroChina (0857 HK) has ordered 150 LNG trucks to add to its logistics fleet.
Weichai Power	2338 HK	In Jul 2010, the company formed a JV with Westport Innovations (WPT CN) and Hong Kong Peterson (CNG) Equipment. The new entity, Weichai Westport Inc. (WWI) researches and develops alternative fuel engines. The new entity indicated that it had the capacity to build 20,000 units LNG engines.
Guanghui Group	600256 CH	As a truck wholesaler, in 2009, the company sold 198 LNG trucks and has planned to sell 3,500 units for 2010. It planned to further increase sales substantially in coming years.
Production of natural gas		
PetroChina	857 HK	PetroChina is China's biggest oil producer
SinoPec	386 HK	Sinopect is one of the major petroleum companies in China.
CNOOC	883 HK	CNOOC focus on the exploitation, exploration and development of crude oil and natural gas offshore of China.
Natural gas refilling service		
Kunlun Energy	135 HK	The Company has adopted the application of LNG as its strategic business approach, and has carried out the planning and deployment of LNG resource and market across the country. Management indicated that there is ample room for development in terms of both the scope of application and degree of utilization, especially the promotion and application of power equipment using natural gas as fuel.
Tianlun Gas	1600 HK	The company planned to participate in the development and exploration of LNG and biofuel business opportunities. Their development and exploration plan of LNG is to establish a LNG processing factory in Shaanxi Province with daily processing capacity of 100,000 m3. The construction period will be approximately one year and they are in the process of negotiating with third parties to jointly invest in the plan.
Cosmopolitan	120 HK	In Oct 2010, the company entered into MOU with respect to acquisition of a target company that proposes to undertake LNG business entailing extracting, processing, transporting and marketing of LNG. The target group has entered into a total of four contracts with the respective government authorities and/or local corporations in the PRC including 1) one contract for the construction and operation of 35 LNG filling stations; 2) one contract for the construction and operation of a LNG liquefaction plant of 500,000,000 m3 capacity; 3) two procurement contracts for the supply of coal seam gas.

Source: compiled by SBI E2-Capital

Opportunity opens up to small & mid-caps at LNG refilling side. In view of relatively high entry barrier of car manufacturing and natural gas production, we think LNG refilling operation is the only channel for small & mid-size companies to tap into the LNG car market. Based on some rough data in hand, we estimate a LNG station can break even if it serves 18 cars a day. If the number increases to 300, similar to which of traditional gas station, the LNG station's net profit can reach as much as RMB9.6m each year. In HK market, we notice three companies, including Kunlun Energy (0135 HK), Tianlun Gas (1600 HK) and Cosmopolitan (0120 HK), officially announced to construct their own LNG refilling network in China. We will keep an eye on these companies for their further development in the particular LNG area.

Table 4. Prelimiary estimates of a LNG station

Car served per day	10	20	100	200	300
Est. initial capex (RMB m)	6.0	6.0	6.0	6.0	6.0
Natural gas volume per fill (m^3)	200.0	200.0	200.0	200.0	200.0
Est. sales volume per day (m^3)	2,000.0	4,000.0	20,000.0	40,000.0	60,000.0
Est. sales volume per year (m^3 m)	0.7	1.5	7.3	14.6	21.9
Natural gas price (RMB/m^3)	3.7	3.7	3.7	3.7	3.7
Natural gas price excl. VAT (RMB/m^3)	3.7	3.7	3.7	3.7	3.7
LNG cost (RMB/m^3)	3.5	3.5	3.5	3.5	3.5
LNG procurement cost (RMB/m^3)	2.7	2.7	2.7	2.7	2.7
Transportation cost (RMB/m^3)	0.8	0.8	0.8	0.8	0.8
LNG cost excl. VAT (RMB/m^3)	3.1	3.1	3.1	3.1	3.1
Financials (RMB m)					
Turnover	2.7	5.4	27.1	54.3	81.4
COGS	(2.3)	(4.5)	(22.6)	(45.2)	(67.8)
Depreciation	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Overhead	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
EBT	(0.3)	0.1	3.7	8.2	12.8
Tax	-	(0.0)	(0.9)	(2.1)	(3.2)
Net profit	(0.3)	0.1	2.8	6.2	9.6

Source: SBI E2-Capital

Table 5. Valuation matrix

Company	Ticker	Fiscal year end	Market cap (US$m)	Historical PER (x)	1-year PER (x)	2-year PER (x)	P/BV (x)	ROE (%)
Dongfeng Motor	489 HK	12/2009	14,912.5	9.6	8.7	8.3	3.0	25.3
Sinotruk	3808 HK	12/2009	2,640.6	14.3	12.2	11.1	1.0	6.8
Beiqi Foton	600166 CH	12/2009	3,602.0	11.4	12.0	10.8	3.1	29.3
Weichai Power	2338 HK	12/2009	14,240.4	13.4	11.6	10.5	4.9	34.5
Guanghui Group	600256 CH	12/2009	7,456.3	76.0	74.8	34.5	13.8	17.1
PetroChina	857 HK	12/2009	309,433.8	13.8	12.2	10.8	1.8	12.6
SinoPec	386 HK	12/2009	107,613.0	9.1	8.0	7.5	1.4	17.6
CNOOC	883 HK	12/2009	101,250.2	15.5	12.7	10.9	3.5	17.6
Kunlun Energy	135 HK	12/2009	7,342.1	25.8	24.4	16.9	3.8	9.6
Tianlun Gas	1600 HK	12/2009	148.6	n.a.	n.a.	9.8	n.a.	53.4
Cosmopolitan	120 HK	03/2010	267.4	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Bloomberg

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