

Asian NGV Communications

Number 97 March 2015

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Asia's ambition as a global leader in natural gas technology

Israel

The government of Israel has inked a Memorandum of Understanding (MoU) with OEM NGV companies to develop natural gas based technologies.

On February 9th, the country's Prime Minister's Office (PMO) through the Israel Fuel Choices Initiative (IFCI) signed a non-binding MoU with Fiat Chrysler Automobiles (FCA), Iveco (a Brand of CNH Industrial) and Magneti Marelli (FCA Group) to work on the development of natural gas based technologies. All party also discussed the possibility of establishing an extended research and development (R&D) co-operation program involving Israeli companies in fields related to alternative fuels, smart mobility and other automotive industry related activities.

FCA, with its passenger cars and light commercial vehicles assortments and Iveco, which is well-known for its wide range of trucks and buses, are recognized leaders in the development, manufacture and distribution of methane vehicles featuring advanced multi-fuel technologies such as Magneti Marelli's powertrain control solutions.

The Israel Fuel Choices Initiative (IFCI) is a ten-year Israeli Government program, funded with USD430 million investments, managed through the Prime Minister's Office, dedicated to reducing the World's dependency on oil for transport and supporting the development of alternative fuels. The Government of Israel aims at making Israel as an alternative fuels knowledge hub by supporting the development and implementation of next-generation technologies. It is also said that Israel is targeting at becoming a global leader in alternative fuel technologies. The program calls for the increased use of alternative fuel technologies in Israel's transportation sector with a significant portion of the vehicle fleet being so equipped by 2020.

UAE

In a bid to reduce air pollution, the Licensing Agency at the Roads and Transport Authority (RTA) has urged driving institutes and centres in Dubai Emirate to consider using CNG in their vehicle fleets. This eco-friendly fuel promotion is in line with RTA's initiatives to curb unfavourable environmental impacts, optimize power consumption, and supporting the green economy in various projects and services provided by affiliated agencies and sectors. The RTA is responsible for planning and providing the requirements of transport, roads & traffic in the Emirate of Dubai, and between Dubai and other Emirates of the UAE, neighboring countries in order to provide an effective and an integrated transport system capable of achieving Dubai's vision and serving the vital interests of the Emirate.



Ahmed Bahrozian, CEO of RTA Licensing Agency, said that the Emirates Driving Institute has joined the green fuel adoption from the start of 2015 by switching 50 vehicles to CNG system. The agency plans to continue converting remaining vehicles throughout the year. The RTA is keen to host projects that contribute to power saving, environmental conservation and carbon footprint reduction. The step is in line with the government's green economy master plan envisioned under the initiative launched by the Dubai Government: A Green Economy for a Sustainable Environment.

It will also support the UAE Vision 2021 and the power strategy of curbing carbon emission adopted by the Dubai Government with the aim of making Dubai a role model in the efficient power consumption and reducing carbon emissions. The RTA held talks with several institutes, encouraged them to convert their fleets into CNG-powered vehicles while informing that Emirates Gas and ENOC are providing a mobile gas station to ensure continuous gas supplies for the fleets.

Amer Belhasa, Executive Director of Emirates Driving Institute, said that the benefit of natural gas is not only limited to making the environment clean, but also go beyond that to include reducing the frequency of vehicle maintenance requirements, and extending the lifespan of the engine.

Thailand

Vice Minister Praipol Koomsup announced in early February that the ministry would proceed with the increase of fuel prices. The implementation of this policy could decrease the price gap between diesel and CNG as diesel price recently dropped by THB 3-4 a litre, while CNG price rose by THB2.50 per kilogram.

Despite of this, CNG is still the cheapest fuel looking at the heating value comparisons among transport fuels in Thailand. CNG price has gone up from THB10.50 per kilogram in September 2014 to THB12.50 in January 2015, and further to THB13 (in February). Public utility vehicle operators can buy CNG at the subsidised price of THB10 per kilogram. Under the government's fuel-price restructuring policy to reflect real cost, the CNG price will be raised further to THB15-Bt16 per kilo.

Currently, about 400,000 trucks are powered by natural gas are using 40 percent of total CNG supply of 9,000 tonnes a day.

Nuttachat Charuchinda, chief operating officer for the upstream petroleum and gas business group at PTT, said that under the company's CNG-station expansion plan for 2015-17, it would add 20 stations, mainly in provinces such as Chon Buri, Samut Prakan, Suphan Buri, Chachoengsao, Nakhon Sawan, Sara Buri and Nakhon Ratchasima. By the end of 2017, PTT is expected to have a total of 518 NG stations, concluded Charuchinda.

India

Two major news from India's car OEMs were released this first quarter of 2015: The launch of Honda CNG Amaze and the facelift of Maruti Ertiga.

In February, Honda Cars India (HCIL) launched the much-anticipated CNG-ready variant of the Amaze sedan. The new CNG Amaze will be equipped with the new variant 1.2 S MT Plus (i-VTEC) at Honda Dealerships located in cities where CNG fuel is available in the country. The CNG ready variant has been specially tuned during production for CNG compatibility by way of optimizing the suspension, application of CNG specific engine components and specially prepared wiring harnesses to ensure high level of quality. It is sold with a 2-year warranty as standard value for all buyers.

Meanwhile, the Maruti Suzuki Ertiga MPV will soon get a facelift and is expected to be launched in June this year. Apart from some improvements in the "body or exterior" of the car, there will be some alterations to the interior part as well, with new features-such as electronic accessories- are expected to be incorporated in the car. Meanwhile, the engines and transmissions of the Ertiga will not be changed. Maruti will offer the 1.4 liter K Series engine with petrol and CNG options. This engine produces 94 Bhp and 230 Nm on petrol and 82 Bhp and 110 Nm on CNG. All variants of the Ertiga (also available in diesel mode) use 5-speed manual transmissions.



전반적인 천연가스 기술의 글로벌 리더로서의 아시아의 야망

이스라엘

이스라엘의 정부는 기술에 기반을 둔 천연 개발을 위한 OEM NGV 기업과 양해각서(MOU)를 체결했다.

2월 9일, 이스라엘 연료 선택 계획(IFCI)를 통한 이스라엘의 국무총리실(PMO)은 천연 가스 기반 기술의 개발을 일하기 위해 피아트 클라이슬러 자동차(FCA), 이베코(Iveco), CNH 산업의 브랜드와 마그네티 마렐리(RCA그룹)와 구속력 없는 양해각서(MOU)를 체결했다. 모든 당사자는 확장된 연구를 확립하는 가능성을 논의하고, 연구 개발(R&D) 협력 프로그램은 대체연료, 스마트 이동성 및 기타 자동차 산업 관련 활동과 관련된 분야에서 이스라엘 회사를 포함한다.

FCA, 그것의 승용차와 가벼운 상업용 차량 구색 및 트럭과 버스의 넓은 범위를 위한 잘 알려진 이베코(Iveco)는 개발, 제조 및 마그네티 마렐리의 파워트레인 제어 솔루션과 같은 고급 멀티 연료 기술을 갖춘 메탄 차량의 유통의 리더로 알려져 있다.

연료 선택 계획(FCI)는 국무총리실에서 관리되는, UDS430 백만 투자가 펀드되어 있는 10년 이스라엘 정부 프로그램이다. 운송을 위한 세계적인 석유 의존도를 줄이고 대체 연료 개발 지원에 최선을 다하고 있다. 이스라엘 정부는 차세대 기술의 개발 및 구현을 지원함으로써 대체 연료 지식 허브처럼 이스라엘을 만드는 것을 목표로 한다. 또한 이스라엘이 대체 연료 기술을 보유한 글로벌 리더가 되는 것에 목표를 하고 있다고 한다. 프로그램은 2020년 까지 차량 함대 장비를 갖춘 중요한 부분과 함께 이스라엘의 운송 분야의 대체 연료 기술의 사용 증가를 요구한다.

UAE

대기 오염을 줄이기 위한 입찰에서, 도로와 운송기관(RTA)의 라이선싱 기관은 차량 함대에 CNG를 사용하는 것이 운전 기관 및 두바이 에미레이트의 센터를 촉구했다. 이 친환경 연료 프로모션은, 불리한 환경에 미치는 영향을 억제하여 전력 소비를 최적화 하며, 소속 기관 및 분야에서 제공하는 다양한 프로젝트와 서비스의 녹색 경제를 지원하는 RTA의 전략과 일치한다. RTA는 계획과 두바이의 에미레이트의 운송, 도로 및 교통의 요구사항을 제공하는 것과 두바이와 아랍에미레이트의 다른 에미레이트, 이웃나라에 효과

적인 두바이의 비전을 달성하고 에미레이트의 중대한 이익을 제공할 수 있는 통합 교통 시스템을 제공 할 책임이 있다.

RTA 라이선싱 기관의 CEO, Ahmed Bahrozyan는 에미레이트 운전 연구소는 CNG 시스템에 50대의 차량을 전환하는 것을 2015년 시작해서 녹색 연료 도입에 합류했다고 밝혔다. 이 기관은 일년 내내 남아 있는 차량의 개조를 계속할 계획이다. RTA는 전력 절약, 환경 보전 및 탄소 배출량 감소에 기여하는 프로젝트를 진행하는데 촉각을 곤두 세우고 있다. 지속 가능한 환경을 위한 녹색 경제: 이 단계는 두바이 정부가 출범 주도하에 상상 정부의 녹색 경제 마스터 플랜과 일치한다.

또한 아랍에미레이트는 비전 2021 두바이에 효과적인 소비 전력의 역할 모델을 만들고, 탄소 배출을 감소시키는 목적으로 두바이 정부에 의해 채택된 탄소 배출을 억제하기 위한 전력 전략을 지원할 것이다. RTA는 여러 기관과 회담을 개최하여 에미레이트 가스와 ENOC는 함대에 지속적인 가스 공급을 보장하기 위해 모바일 주유소를 제공하고 있음을 알리는 동안 CNG로 구동되는 차량에 그들의 함대를 개조하는 그들을 격려했다.

에미레이트 운전 연구소의 전문 이사 Amer Belhasa는 천연가스의 장점은 환경을 깨끗하게 만든데 한정되지 않고, 차량 유지 보수 요구의 빈도를 감소시키고 엔진의 수명을 연장하는 것을 포함한다고 말했다.

태국

Praipol Koomsup 차관은 부처에서 증가를 진행하는 것을 2월 초에 발표했다. 이 정책의 구현은 CNG 가격이 킬로그램당 THB2.50 상승되면서, 디젤 가격이 최근에 리터당 THB 3-4 떨어진 것과 같이 디젤과 CNG사이의 가격 차이를 줄일 수 있다.

이러에도 불구하고, CNG는 여전히 태국에서 수송 연료 중 발열량으로 비교하여 가장 저렴한 연료이다. CNG 가격은 2014년 9월 킬로그램당 THB10.50에서 2015년 1월 THB12.50으로 올랐다. 지금은 THB 13이다. (2월에). 공영 차량 운영자는 킬로그램당 THB10의 보조된 가격으로 CNG를 구입할 수 있다. 실제 비용을 반영하기 위해 정부의 연료 가격 구조 조정 정책에 따라, CNG 가격은 킬로그램 THB15-Bt16으로 인상될 것이다.

현재, 약40만 트럭은 하루에 9,000톤의 총 CNG 공급의 40%를 차지하는 천연가스에 의해 구동된다.

PTT의 업스트림 석유와 가스 사업 그룹을 위한 최고 운영 책임자, Nuttachat Charuchinda는 2015-17년에 회사의 NGV-충전소 확장 계획에 따라 Chon Buri, Samut Prakan, Suphan Buri, Chachoengsao, Nakhon Sawan, Sara Buri and Nakhon Ratchasima와 같은 주의 중심으로 20개의 충전소가 추가될 것이라고 말했다. 2017년말까지, PTT는 518 NGV 충전소의 전체를 가질 것으로 예상된다 Charuchinda는 결론지었다.

인도

인도의 자동차 OEM 업체의 2가지 중요한 뉴스는 2015년 1분기에 발표되었다. : 혼다의 CNG Amaze와 마루티 에티가의 외장 개조 차량의 출시

2월에, 혼다 자동차 인도(HCIL)는 Amaze 세단의 CNG 준비 변형에 많은 기대를 모아 출시되었다. 새로운 CNG Amaze는 CNG 연료 사용이 가능한 국가의 도시에 위치한 혼다 딜러십의 새로운 변형 1.2 S MT Plus (i-VTEC)를 갖추게 될 것이다. CNG 준비 변형은 서스펜션 최적화의 방법에 의해 CNG 호환, CNG 특징 엔진 구성요소의 어플리케이션 및 특별히 품질의 높은 수진을 보장하기 위한 와이어링 하네스 준비를 위하여 제작되는 동안 특별하게 준비되었다. 그것은 모든 구매자를 위한 표준 값으로 2년 보증하여 판매되고 있다.

한편, 마루티 스포츠 유틸리티가 MPV는 곧 외장 개조되어 질 것이고, 올해 6월에 발표되어질 것으로 예상된다. 자동차의 "몸 또는 외부"의 약간의 개선에 대한 부분은 새로운 기능 - 전자식 보조프로그램 같은-이 자동차의 통합될 것으로 예상될 뿐만 아니라 내부 부분에 약간의 변경이 있을 것이다. 한편, 에티가의 엔진과 트랜스미션은 변경되지 않을 것이다. 마루티는 가솔린과 CNG 옵션으로 1.4리터 K 시리즈 엔진을 제공할 것이다. 이 엔진은 가솔린에서 94 마력과 230Nm와 CNG에서 82마력과 110Nm를 만들어 낸다. 에티가의 모든 변형은 (디젤 모드도 가능) 5단 변속기를 사용한다.

오염 수준의 감소는 제외하고, 도로부서는 자동차와 이륜차의 필수 안전 기준을 만드는 것에 대단한 관심과 열심으로 일하고 있다.



Cita-cita Asia sebagai pemimpin global dalam teknologi gas

Israel

Pemerintah Israel telah menandatangani Memorandum Persefahaman (MoU) dengan syarikat-syarikat OEM NGV untuk memngembangkan bermacam-macam teknologi yang menggunakan gas metan sebagai tenaga intinya.

Pada tanggal 9 Februari, sejalan dengan program Inisiatif Pilihan Bahan Bakar Israel (IFCI), kantor Perdana Menteri Israel menandatangani MoU tidak terikat dengan Fiat Chrysler Automobiles (FCA), Iveco (anggota CNH Industri) dan Magneti Marelli (Grup FCA) untuk bekerja sama mengembangan teknologi yang menggunakan bahan bakar gas alam. Semua pihak juga membincangkan kemungkinan R & D jangka panjang yang akan melibatkan perusahaan-perusahaan Israel dalam bidang yang berkaitan dengan bahan bakar alternatif, mobilitas efisien dan aktivitas lainnya yang berkaitan dengan industri automotif.

FCA, dengan teknologi mobil dan kenderaan komersil ringannya, serta Iveco yang terkenal dengan produk truk dan busnya, sangatlah terkenal dalam bidangnya sebagai pengembang, produksi dan distribusi kenderaan berbahan bakar gas/metan yang menggunakan teknologi multi-bahan bakar seperti teknologi control powertrain dari Magneti Marelli.

IFCI adalah program sepuluh tahun pemerintah Israel yang didanai USD430 juta, dikelola melalui Kantor Perdana Menteri. Program ini bertujuan untuk mengurangi ketergantungan dunia pada bahan bakar minyak di bidang transportasi, dan mendukung pengembangan bahan bakar alternatif. Pemerintah Israel bertujuan untuk membuat negara ini sebagai pusat ilmu bahan bakar alternatif dan mendukung pengembangan dan penerapan teknologi generasi berikutnya. Juga dilaporkan bahwa Israel menargetkan menjadi pemimpin global dalam teknologi bahan bakar alternatif. Program ini bertujuan untuk peningkatan penggunaan teknologi bahan bakar alternatif di sektor transportasi Israel dengan porsi yang signifikan dari armada kendaraan totalnya pada tahun 2020.

UAE

Untuk mengurangi polusi udara, Badan Otoritas Transportasi (RTA) menghimbau lembaga-lembaga pengemudi di Dubai Emirat untuk mempertimbangkan penggunaan BBG dalam armada kendaraan mereka. Promosi bahan bakar ramah lingkungan ini sejalan dengan inisiatif RTA yang mengurangi dampak lingkungan hidup yang kurang baik, mengoptimalkan konsumsi energi, dan mendukung perekonomian hijau dalam berbagai proyek dan pelayanan yang ditawarkan lembaga afiliasi dan sektor-sektor terkait. RTA bertanggung jawab atas perencanaan dan pembuatan persyaratan transportasi, jalan dan lalu lintas di Dubai Emirat, dan antara Dubai dan Emirat-emirat lain dari UEA, serta negara-negara tetangga sehingga



terwujud sistem transportasi efektif yang terintegrasi serta mampu mencapai visi Dubai dan melayani kepentingan vital Emirat. Ahmed Bahrozyan, CEO Badan Perizinan RTA, mengatakan bahwa Emirates Driving Institute telah menggunakan bahan bakar “bersih” dari awal tahun 2015 dengan konversi 50 kendaraannya ke sistem CNG. Badan ini berencana untuk terus mengkonversi kendaraan-kendaraan lainnya sepanjang tahun. RTA sangat ingin menggalang proyek-proyek yang berkontribusi terhadap penghematan energi, konservasi lingkungan dan pengurangan emisi karbon. Langkah ini sejalan dengan rencana pemerintah yang diluncurkan oleh Pemerintah Dubai: Sebuah Ekonomi Hijau untuk Lingkungan Berkesinambungan.

Proyek ini juga akan mendukung Visi UAE 2021 dan strategi sumber tenaga listrik dalam rangka membatasi emisi karbon. Proyek yang diadopsi oleh Pemerintah Dubai ini bertujuan untuk



membuat Dubai menjadi panutan dalam konsumsi daya yang efisien dan mengurangi emisi karbon. RTA mengadakan pembicaraan dengan beberapa lembaga, mendorong mereka untuk mengubah armada mereka ke kendaraan bertenaga CNG serta menginformasikan bahwa Emirates Gas dan ENOC menyediakan stasiun pengisian bahan bakar CNG mobile (berjalan) untuk menjamin pasokan gas bagi armada kendaraan NGV ini.

Amer Belhasa, Direktur Eksekutif Emirates Driving Institute, mengatakan bahwa manfaat dari gas alam tidak hanya membuat lingkungan bersih, tapi juga mengurangi frekuensi persyaratan pemeliharaan kendaraan, dan memperpanjang umur mesin.

Thailand

Wakil Menteri Praipol Koomsup mengumumkan pada awal Februari bahwa kementerian akan melanjutkan kenaikan bahan bakar. Pelaksanaan kebijakan ini bisa mengurangi kesenjangan harga antara diesel dan CNG kanar harga solar baru turun THB 3-4 liter, sedangkan harga CNG naik THB2.50 per kilogram.

Meskipun demikian, CNG masih merupakan bahan bakar termurah jika kita melihat perbandingan nilai kalor diantara bahan bakar transport di Thailand. Harga CNG sudah naik dari THB10.50 per kilogram pada bulan September 2014 menjadi THB12.50 pada bulan Januari 2015, hingga THB13 (bulan Februari). Operator kendaraan utilitas umum dapat membeli CNG dengan harga bersubsidi, yaitu seharga THB10 per kilogram. Menurut kebijakan restrukturisasi harga BBM dari pemerintah, untuk harga CNG akan dinaikkan lebih lanjut menjadi THB15-Bt16 per kilo ahing mencerminkan biaya riil dari penyediaan bahan bakarnya.

Saat ini, sekitar 400.000 truk yang didukung oleh gas alam menggunakan 40 persen dari total 9.000 ton per hari pasokan CNG di Thailand.



Nuttachat Charuchinda, chief operating officer divisi hulu minyak dan di perusahaan PTT, mengatakan bahwa menurut rencana ekspansi stasiun CNG tahun 2015-17, perusahaan ini akan menambah 20 stasiun, terutama di provinsi-provinsi seperti Chon Buri, Samut Prakan, Suphan Buri, Chachoengsao, Nakhon Sawan, Sara Buri dan Nakhon Ratchasima. Pada akhir 2017, PTT diharapkan memiliki total 518 stasiun CNG, kata Charuchinda.

India

Dua berita utama dari OEM mobil India yang dirilis kuartal pertama 2015 ini adalah Peluncuran Honda CNG Amaze dan facelift dari Maruti Ertiga.

Pada bulan Februari, Honda Mobil India (HCIL) meluncurkan varian CNG dari sedan Amaze. CNG Amaze ini akan dilengkapi dengan varian baru 1.2 S MT Plus (i-VTEC), di dealer Honda yang terletak di kota-kota yang mempunyai supply bahan bakar CNG. Varian CNG siap pakai ini secara khusus disetel untuk memiliki kompatibilitas CNG dengan cara mengoptimalkan suspensi, penerapan CNG komponen mesin tertentu, dan pemanfaatan kabel khusus disiapkan untuk memastikan tingkat kualitas yang tinggi. Sedan ini dijual dengan garansi 2 tahun.

Sementara itu, Maruti Suzuki Ertiga MPV akan segera mendapatkan facelift dan diharapkan akan diluncurkan pada bulan Juni tahun ini. Selain beberapa perbaikan di "body atau eksterior" mobil, beberapa perubahan juga akan diterapkan pada bagian interior juga, dengan fitur-seperti baru aksesoris-elektronik, dan lain-lain. Sementara itu, mesin dan transmisi dari Ertiga tidak akan berubah. Maruti akan menawarkan 1,4 liter K Series dengan opsi yang berbahan bakar bensin dan CNG. Mesin ini menghasilkan 94 Bhp dan 230 Nm pada bensin dan 82 Bhp dan 110 Nm pada CNG. Semua varian Ertiga (juga tersedia dalam mode diesel) menggunakan 5-speed transmisi manual.

India's first CNG powered train

In January this year, India's Union Minister for Railways Suresh Prabhu inaugurated the country's first CNG train on the Rewari – Rohtak link of Northern Zone.

The train is powered by CNG Diesel Electric Multiple Unit (DEMU) with dual-fuel system fuelled by diesel and CNG. It was manufactured by Chennai-based Integral Coach Factory (ICF) with fumigation technology.

Using CNG would help reducing the operating cost of locomotives by over 50 percent. Additionally, it will emit less pollution compared with using only diesel as fuel, by cutting carbon monoxide emissions by 90 percent, carbon dioxide by 25 percent, nitrogen oxide by 35 percent and non-methane hydrocarbon emissions by 50 percent.

Union Railway Ministry also planned to run more such CNG trains in the future to reduce diesel consumption. The local stakeholders in India expect that India would have substantial reserves of natural gas in the form of conventional natural gas, shale gas and gas hydrates. These are needed to support the success of CNG adoption in the railway industry.



Bio-CNG project for Punjab in Pakistan



Punjab government announced its intention to explore biogas CNG potential in the state by setting up –at least- one pilot plant in each district of the state.

The government expects that such projects will not only create business opportunities for investors but also generate income for farmers with cattle. The farmers can sell cattle dung as raw material for the biogas generation.

Under bio-CNG project, cattle dung or agricultural residue is used for production of biogas which is further purified (to be so-called biomethane) and filled in cylinders as Bio-CNG.

NGV market projections

Navigant Research, a market research and consulting team that provides in-depth analysis of global clean technology markets, said through its recent report that global sales of NGVs will grow to nearly 4 million annually by 2024. Furthermore, the study says fleets and commercial operators will likely dominate the North American NGV market.

According to the report, main customer targets for NGVs users are high-mileage fleet operators and consumers in regions with high retail prices for liquid fuels. The research firm expects the sales of NGVs to rise from 2.3 million annually in 2014 to 3.9 million in 2024.

Recently, prices for natural gas is getting cheaper thanks to increased gas production in North America and other regions - along with additional pipelines for distribution in Asia Pacific and Europe, according to Sam Abuelsamid, senior research analyst with Navigant Research.

NGV markets in several regions are expected to grow significantly over the next ten years, particularly China. In fact, Asia has been the no. 1 region- with biggest number of NGVs- since the past few years.

The importance of Asia is going to be yet again confirmed as the international association of the industry, NGV Global, will deliver a forum to discuss the commercial opportunities within the expanding Asian NGV market as a part of Gastech Singapore, 27 – 30 October 2015. An NGV Zone will also be incorporated in this major gas event.

Recently released statistics show that half of the world's NGV's and stations are in Asia with growth in both averaging 20 percent per year. In a recent report, Navigant Research predicted that by 2022 medium and heavy-duty vehicles (M-HDVs) powered by natural/methane gas could reach 3.7 million units (up from 2.09 million in December 2013) and 76.2 percent of the market for buses and trucks will be in Asia.



Curtis Island LNG facility in Australia

In February this year, Jacobs Engineering Group Inc. (JEC)-providers of technical professional and construction services-announced that the company signed an engineering services agreement with ConocoPhillips to support the sustaining capital program for the Australia Pacific LNG facility after its completion. Jacob's scope of work includes engineering studies, Front-End Engineering Design (FEED) services, and detail design including procurement, commissioning and construction support for sustaining capital and mid-cap projects at the facility over a period

of four years. There is a possibility to extend the agreement to four more years.

The LNG facility is located on Curtis Island in Queensland, Australia. It has two LNG trains, each capable of producing 4.5Mtpa of LNG. It is expected that by mid-2015, Train 1 will deliver its first production, with Train 2 to start before mid-2016.

The plant was designed with the potential to cover up to four LNG trains. ConocoPhillips operates the facility on behalf of Australia Pacific LNG.

Launching Honda Amaze CNG

Honda Cars India Ltd. (HCIL) recently launched its CNG-ready variant of compact sedan Honda Amaze. The sedan has Rs. 599,585 price tag on it, for which, buyers will get 1.2 S MT Plus (i-VTEC) technology which already including Rs. 54,315 CNG kit installation. The new variant will come with a 2-year warranty as standard value for all buyers.

Jnaneswar Sen, Senior Vice President, Marketing and Sales, Honda Cars India said that the Amaze with a CNG option was cheaper to run and maintain as well as eco-friendly. The company is looking for an alternate fuel vehicle with high performance and low running cost.

The new variant Amaze 1.2 S MT Plus (i-VTEC) is modified petrol Honda Amaze which is compatible for CNG fuel option.

The Honda approved CNG kit will be fitted at Honda Dealerships located in Indian cities where CNG fuel is available. This CNG ready variant of Amaze has been specially tuned during produc-



tion for CNG compatibility by way of optimizing the suspension, application of CNG specific engine components and specially prepared wiring harnesses to ensure high level of quality.

Possible launch of Force Trax CNG

India's car, Light-Duty Commercial and agricultural vehicles maker, Force Motors, earlier announced that it will invest a Rp 10 billion in its business over the next few years. The financing will be used to develop new products and set up a powertrain facility for another vehicle maker-BMW. While the BMW powertrain facility is ready, people in India is still waiting for new launching from its product development activities.

One might ask what the Force Motors product development team is working on. Recently, some people saw a CNG variant of Force Motors' Trax range of commercial people carriers on trial across Pune roads.

The vehicle undergoing road trial has a CNG sticker above the left taillight, while a CNG cylinder is placed behind the foot board. As of now, the only CNG engine at Force Motor's disposal is a 2.0-litre three-cylinder unit that is being employed

by the Trump 40 cargo carrier. The engine develops 41.5 bhp and 124 Nm of torque which are not simply strong enough to propel the Trax. Therefore, local motor enthusiasts expect an entirely different CNG engine is used for this carrier.

As of now, the Force Trax is powered by a 2.6-litre inline four-cylinder diesel engine which develops a modest 60 bhp and 158 Nm of torque. Transmission duties are handled by a 5-speed synchromesh manual gearbox. This motor could be converted to run on CNG.

The CNG variant is expected to be launched soon. The new engine would serve all the four Trax variants – Gama, Toofan, Cruiser and Ambulance. The new version that runs on the cleaner fuel has the potential to expand the CV's market share in important CNG regions of the country like Delhi, Mumbai and Pune.

◀ First LNG cargo to Pakistan

For years Pakistan has been busy allocating gas among different sectors, when demand is higher than supply, especially during winter. The continuing increasing demand, also thank to the rapid growth in the CNG for transport sector. Due to the same reason, gas shortage, CNG vehicles and fueling sector has been cooling down a lot as filling stations opening time being rationalized with rotational closing periods.

However, good news emerged when the government started looking at LNG imports to relieve the supply pressure. Some even suggested that the LNG can be used to supply CNG stations while the rest of gas diverted to industrial, household, and power generation. According to Petroleum Minister Abbasi, the government would give LNG to the CNG industry from its share as an interim arrangement, which would provide relief to the consumers while easing the pressure on petrol. It would also generate employment. However, ongoing discussion still takes place regarding the potential LNG allocation.

Nevertheless, LNG supply initiative was expected to reach another milestone as Qatar assured Pakistan of the delivery of first LNG cargo by the end of February.

Earlier, both the countries had agreed on all the clauses of the contract including the volume and contract terms, although both sides are yet to decide on the price. According to related officials, the agreement will involve the supply of 400 million cubic feet of gas per day (mmcfd) this year. Earlier, Pakistan was supposed to import 200 mmcfd in the first year and 400 mmcfd in the second year. The two sides have also agreed on a 15-year supply contract.

Minister for Petroleum and Natural Resources Shahid Khaqan Abbasi has requested gas company Sui Southern Gas Company (SSGC) and Port Qasim Authority (PQA) to be ready in all respects by February 28 for receiving LNG supplies. He advised Pakistan State Oil (PSO) managing director to give a window of the said period to Qatargas for the supply of commissioned cargo.

Elengy Terminal Pakistan Limited Chief Executive Officer Imran Sheikh also said that the construction of the LNG terminal was in progress as per schedule. The Floating Storage and Re-gasification Unit (FSRU) would be ready to pick LNG cargo for sellers by end of February and would reach Karachi within two to three days. As per discussion, LNG prices were linked to crude oil.

Independent power plants (IPPs) and Kapco had been identified as LNG consumers and the CNG (for vehicles) sector may be supplied LNG as an alternative buyer. Government plans to allocate 100 million cubic feet of LNG per day to the CNG stations of Punjab, which were shut down during the winter season for three months.

To support the NGV segment, the government has promised that the sector in Punjab will receive the first shipment of LNG in March this year from Qatar.

LNG imports is expected to revive the CNG vehicles segment with a financial impact of Rs200 billion foreseen thanks to the fuel supply. The CNG industry has invested Rs450 billion and the infrastructure is already available.



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Port Qasim, a deep-water seaport in Karachi City is Pakistan's second busiest port, handling about 35 percent of the nation's cargo (17 million tons per annum). Port Qasim and Karachi Port, the busiest port of country, together handle more than 90 percent of all external trade of Pakistan. The country's first LNG import was scheduled to arrive in this port by end of February 2015.

M. Ravindran appointed as Chairman of IGL

In early February, M. Ravindran was appointed as the Chairman of Indraprastha Gas Ltd (IGL), the sole provider of CNG in New Delhi.

Ravindran succeeded KK Gupta who has completed his two-year tenure in IGL and now acted as the Director (Marketing) of Bharat Petroleum Corporation Ltd (BPCL).

About IGL

- IGL is a joint venture of GAIL (India) Limited, Bharat Petroleum Corporation Ltd (BPCL) and Delhi Government.
- It is the sole supplier of CNG and Piped Natural Gas (PNG) in the National Capital Territory (NCT) of Delhi, Noida, Greater Noida and Ghaziabad.
- It has around 9,500 km of pipeline network and meets fuel requirements of over 770,000 vehicles running on CNG in NCR through a network of 297 CNG stations.
- IGL is also supplying PNG to nearly 530,000 households in Delhi and NCR towns.



M. Ravindran, new Chairman of IGL

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Europe's new vehicle market: Prospects to 2019

For NGV (and filling station) related equipment and vehicle manufacturers in Asia who are interested in the European market, there is a report recently released regarding Europe's new vehicle market. It covers both Light and Heavy-Duty segments, and not limited only to certain fuel applications.

In 2014, demand in the European light vehicle (LV) market grew to 17 million units. Heavy commercial vehicle (HCV) performance was less successful, the market declining due to weaker demand in Russia and emissions-related disruption in many of the EU and EFTA markets.

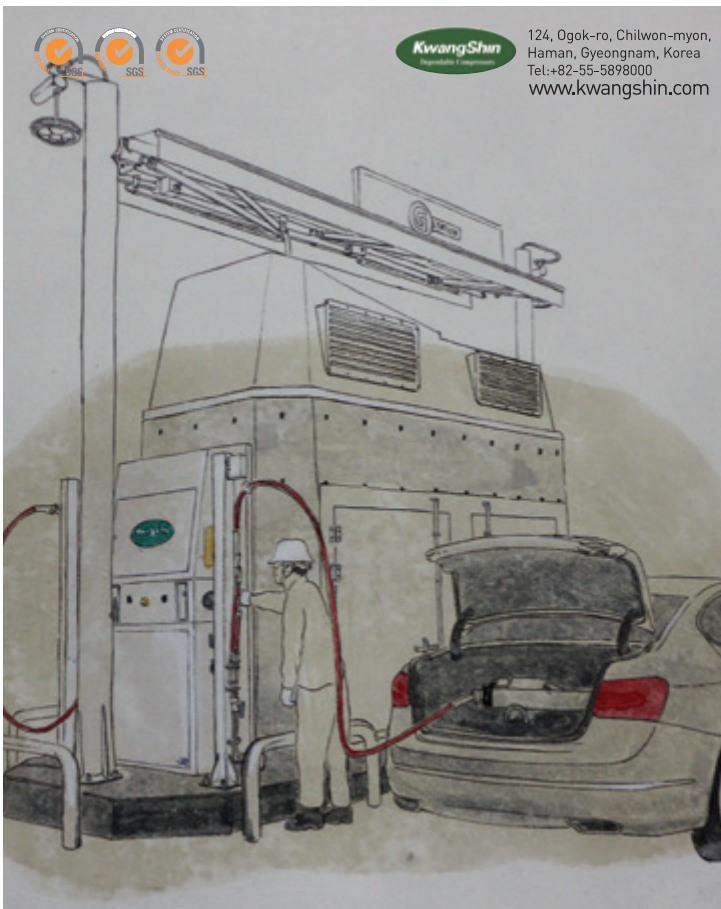
Beyond 2015, some recovery in the Russian market is cautiously assumed, which should be reflected in the country's LV and HCV sales, and in the performance of the European market as a whole.

This exclusive Automotive World report looks at the prospects for LVs and HCVs in 33 European markets in the period 2015 to 2019, including 26 of the 28 EU member states, three EFTA markets plus Bosnia & Herzegovina, Macedonia, Russia and Serbia & Montenegro.

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Israel as an AFT technology centre

In 2011, the Israeli government launched Israel Fuel Choices Initiative (IFCI), a program that seeks to make Israel a leader in alternative energies for transportation — including developing electrical, biofuel, hydrogen, natural gas, and other fuel solutions for vehicles. The interest towards alternative fuelled transport was supported by the government's believe that one day oil prices might be become expensive while start-ups and automobile manufacturers sell more vehicles when the fuel that runs them is cheaper. Therefore, developing technologies powered by alternative fuels—that might be cheaper than traditional oil in the future, is a very sensible decision. As part of the IFCI, the Prime Minister's Office recently signed a non-binding Memorandum of Understanding with Fiat Chrysler Automobiles, Iveco, and Magneti Marelli for cooperation in the development of natural-gas based technologies for cars, trucks and buses.

In general, the IFCI group includes representatives of nine government ministries. Eyal Rosner, chairman and director of IFCI, is the one who coordinates the activities, the funding, and the development of technologies such as fuel cells, electric vehicles, hybrids, biodiesel-fueled vehicles, ethanol/methanol fuel, and even algae fuel.

The government aims to have 10-20 percent of the country's electricity produced from non-fossil fuel sources by 2020. This plan was reported to be currently-behind-schedule yet still being pursued.

To date, globally, petrol refined from oil has a near monopoly as a transportation fuel in which 96 percent of the vehicles are powered by petroleum fuelled engines. For many countries, oil for transportation takes a huge share of the national Gross Domestic Product while it is estimated to be the source of about 25 percent of greenhouse gases. In Israel, oil imports accounts for almost 20 percent of the country's total import.

According to the group, related stakeholders are turning Israel into a test bed, and will attract partners from all over the world with its various alternative energy development projects.

Some of the projects were proven successful. For example the Phinergy aluminum-air battery for electric vehicles that allows a threefold increase in travel range over a regular electric vehicle, and weighs much less than conventional batteries.

Back to the recent deal for the development of natural gas based transportation, the IFCI will coordinate with Fiat Chrysler, Iveco, and Magneti Marelli are also discussing the possibility of establishing an extended R&D cooperation program involving Israeli companies in fields related to alternative fuels, smart mobility and other automotive-industry related activities. The organizations will discuss timetables and specifics in meetings over the coming months, as they negotiate a final deal.

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Development on the adoption of CNG vehicles for Rohtang



The Himachal Government has decided to file an affidavit before the National Green Tribunal (NGT) seeking review of its earlier decision regarding plying of only CNG vehicles between Vashisht and Rohtang to reduce pollution. As per previous decision, plying CNG vehicles to Rohtang from the next tourist season would not be feasible.

Though the Transport Department has been pursuing the issue of setting up of a CNG station at Manali with the Union Petroleum and Natural Gas Ministry but it is unlikely that it will come before the next tourist season from April.

Various issues regarding plying of CNG buses, removal of violations in the form of dhabas along the road which were throwing waste in the open and transfer of forest land for creating facilities was also discussed.

It has also been decided that the Tourism Department will push the case for setting up of an aerial ropeway between Vashisht and Rohtang so that the number of vehicle making a beeline to Rohtang can be reduced, which will drastically bring down the pollution caused by vehicular emissions. The NGT had said the earlier stand of the Tourism Department that the ropeway was not feasible was not based on evidence as its officials had not studied similar projects in Jammu and Kashmir.

Ban of old vehicles

On January 22th this year, National Green Tribunal (NGT) told Himachal Pradesh government to ban the movement of all tourist vehicles older than 15 years from crossing Rohtang Pass.

The government should, instead, make CNG buses operational for tourists to keep the environs clean at (13,050 feet high) Rohtang Pass as well as Marhi, a downhill base camp.

The NGT then asked the Indian Oil Corporation and Natural Gas Regulatory Board to submit a comprehensive report on short term and long term measures for setting-up a CNG station to be made operational before next tourist season.

In its order, the Tribunal has also told the State Pollution Control Board and Central Pollution control Board to make necessary arrangements to set-up infrastructure for monitoring air quality at Manali, Vashisht, Marhi and Gulaba, besides Rohtang pass.

The government will also install checkpoints, both at Vashisht and Gulaba, containing a weighing machine and other instruments for testing emission standards of the vehicles.



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Baku City received Iveco Crealis CNG buses

Bakubus LLC has received the first batch of 302 buses within the renewal of the Baku bus fleet, in February. The fleet will be operated in Baku-the capital and largest city in Azerbaijan.

Ilham Aliyev, President of Azerbaijan, and Mehriban Aliyeva, the First Lady, Chairperson of the Organizing Committee of the first European Games Baku-June 2015, familiarized themselves with the works carried out in the bus depot and Bakubus LLC Training Center.

President Aliyev and the First Lady examined Mercedes minibuses purchased for transportation of VIP guests attending the European Games, as well as new IVECO buses purchased by Bakubus LLC. At the first stage the Company purchased 302 buses equipped with validators for making payment by cards, which can also be used in metro.

Bakubus LLC has been established under the executive authorities of Baku to renovate the public transport system in the capital. In accordance with the agreement, Iveco Bus supplies Crealis buses with Cursor 8 CNG engines. The Crealis has been designed especially for city bus fleets and has low-floor configuration providing comfortable access to the bus for passengers with limited abilities. The buses conform to Euro VI emission standard.



CNG facilities

Rovnag Abdullayev, CEO of State Oil Company of Azerbaijan Republic (SOCAR) previously informed that the firm will build six CNG filling stations in 2015, following the government request.

The facilities will be located on the outskirts of Baku. Further stations are planned over 2015, reportedly to be located approximately 180 kilometers apart throughout the city.

World's first CNG carrier vessel

Indonesia state-owned power company, PT Perusahaan Listrik Negara (PLN), will soon operate the world's first ever carrier vessel for CNG. This will be the first dual-fuel powered vessel owned by an Indonesian ship owner. PLN incorporate the gas-powered ship following the government's policy to promote the use of natural gas in both marine and land-base transport.

The 110 meter long ship is being built at the Jiangsu Hantong shipyard in China ordered by CIMC ENRIC and designed by CIMC ORIC for the buyer, PLN.

The new ship will be powered by a 9-cylinder Wärtsilä 34DF dual-fuel main engine operating primarily on gas. Wärtsilä will also supply the controlled pitch propeller and gearbox, to be fully integrated so as to optimize the propulsion efficiency.

The ship is scheduled to be in operation in May 2016 and will transport CNG from Gresik in East Java Province to Lombok Island where the gas will be used to fuel a power plant.

PLN oil-based fuels and gas division head Suryadi Mardjoeki said: "We expect that this CNG carrier will be a model for other Indonesian owners as the government's policy is to promote energy-efficient and cleaner sea transportation through the use of gas fuelled engines."

The vessel will be designed and constructed under the classification society American Bureau of Shipping (ABS) and PT. Biro Klasifikasi Indonesia (Persero) (BKI).



The world's largest CNG storage system

Meanwhile, in Grati power plant in Pasuruan City-east Java- stored CNG aboard vessels and use the fuel as feedstock for a fuel oil peaking power plant that has been retrofitted to run on gas. Operated by PT PLN, the 300MW unit has been classified as "the world's largest CNG storage system," while a similar project is due to start up on Lombok Island in 2016 (see above Gresik-Lombok story).

Reducing barriers of CNG station network development

Indonesia largest gas distributor and the country's state owned Oil & Gas Company- PT Perusahaan Gas Negara (PGN) and PT Pertamina (Pertamina)- signed a memorandum of understanding (MoU) in January to facilitate gas distribution to natural gas filling stations in Indonesia.

As per MoU, the gas distributor already identified 73 existing fuel stations in the Greater Jakarta area that could become multi-fuel outlets, to be complemented with CNG dispensing facilities.

Pertamina has identified retail stations that interconnect with PGN gas pipelines in multiple clusters. Later station development will be prioritized based on proximity to PGN infrastructure.

The collaboration is expected to reduce existing barriers to the gas station development, such as land

acquisition and licensing, while allowing a faster and more efficient stations establishment. Pertamina will add CNG filling facilities such as dispensers, compressors, gas dryer and other facilities, completing each installation in about four months, much faster than building the station from scratch.

Pertamina's Director of New & Renewable Energy Yenni Andayani underlines the needed support from the government side in relation with vehicles conversions.

Favorable policies related to the availability of converter kits, installation of adequate prepared workshops, and incentives to vehicle manufacturers that produce NGVs are some examples of the expected support from the government. Additionally, municipalities can also encourage fuel switch to CNG by issuing mandates for all public transport and taxis to use CNG to power their fleets.



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Two Honda City CNG cars donated to BPPT for research purpose

The Indonesian branch of Japan-based vehicle maker, PT Honda Prospect Motors (HPM), donated a CNG variant of its Honda City compact sedan to the Agency for the Assessment and Application of Technology (BPPT) on February 16th, to help the agency's research on alternative fuel. Earlier in 2006, PT HPM donated a Honda Civic Hybrid to BPPT.

BPPT head Unggul Priyanto was very pleased with the donation of these two CNG cars that would help the institute's research on alternative fuel.

Meanwhile, Research and Technology and Higher Education Minister Muhammad Nasir said the government supported the research, particularly on the potential of compressed natural gas as a mainstream fuel source. The Minister targeted that by 2016 or 2017, CNG cars should have already hit the road.

Nasir added that Honda was also willing to donate more alternative fuel vehicles, such as hybrid or possibly electric cars, for the purpose of research. He said that Japanese carmakers planned to donate around 40 cars this year. The Honda City CNG is equipped with bifuel system, and has both CNG and petrol tanks. It has a four cylinders 1,500 cc 1-VTEC SOHC engine, with a maximum power of 118.3 hp on petrol and 100.6 hp on the CNG system.

The 42-liter CNG tank is located inside the trunk of the car and is designed to withstand heat through its various safety devices such as a shut-off valve, temperature sensors and pressure outlet. As an additional safety precaution, the usually odorless CNG has been given a smell to help the driver detect leakages.

Honda underlines that CNG development is suitable in Indonesia due to the abundance of the resource.

"We hope that researching the Honda City CNG will bring large benefits and create solutions regarding alternative fuels for a better environment," PT HPM president director Tomoki Uchida said.

PT HPM marketing and after sales manager Jonfis Fandy said the Honda City CNG was unveiled in Thailand in 2012, however, there was no plan yet to sell it in Indonesia. However, the company said the plan to develop CNG cars was the initiative of both the company and the Indonesian government, and could be run when the government thought the time was right. When the government is ready to fully support the adoption of CNG vehicles and the required refuelling infrastructure (in sufficient number), Honda would then be ready to release Honda City CNG in Indonesian market.



Automotive Compressed Natural Gas Vehicles market 2015-2025

Growth prospects for CNG passenger cars

In 2015 the market for CNG vehicles is still in its infancy despite a growth in sales, especially through 2009 to 2014. The CNG Passenger Car market is currently characterized by a high level of concentration in a small number of countries, low penetration in the major automotive markets and limited supply of models by OEMs. The latter is mainly due to the significant upfront purchase cost in comparison with petroleum-fuelled vehicles, and due to the relatively high cost of aftermarket conversion.

However, the market represents significant potential and is expected to record robust growth in the forecast period. Investment in new CNG stations will help overcome the lack of a sufficient refuelling infrastructure, the biggest restraint the market faces. Additionally, the introduction of a greater breadth of CNG models by OEMs will enable both reduction in the conversion cost and greater NGV ownership as the price advantage of Natural Gas over other fuels will continue throughout 2015-2025. This price advantage, though hampered by the slump in oil prices in late 2014 and early 2015, will stabilize over the near-term and ultimately facilitate a greater level of CNG Passenger Car adoption.

The markets of China, India and Iran are expected by visiongain to continue their strong growth, as gas infrastructure develops and refuelling stations are constructed to develop a CNG fuelling network with greater coverage. Latin America is another market forecast to grow steadfastly, and within Europe the national markets of Italy and Germany show considerable potential.

Through the report, the author presents the following information:

- Global automotive CNG passenger car sales forecasts and analysis and the resulting CNG passenger car population forecast from 2015-2025;
- Two expert interviews from key opinion leaders, informing the forecasting and underpinning visiongain analysis;
- Around 211 tables, figures and graphs exploring the CNG passenger car market;
- Sales predictions for the key CNG passenger car submarket forecasts by fitment type from 2015-2025;
- The 15 leading national CNG passenger car markets from 2015-2025 across the world, with insight into the specific market drivers and restraints in each national market, as well as overall regional population forecasts for 2015-2025;



- Forecasts and analysis supporting the CNG passenger car projections;
- The market prospects for the leading CNG passenger car product types for 2015;
- The factors affecting Car Manufacturers, Aftermarket Conversion Vendors, CNG Fuel Station Operators, Gas Infrastructure Developers and everyone within the value chain. Learn about the forces influencing market dynamics;
- The leading companies in the compressed natural gas vehicle market passenger car market

To see a report overview please check www.visiongain.com



Advanced LNG-powered LNG carrier

Daewoo Shipbuilding & Marine Engineering (DSME) has won a contract to build an LNG carrier that would use LNG to run its engine.

The USD 200 million contract involves the production of a 174,000 cubic meter “next generation” dual-fuel LNG carrier equipped with a DSME-designed LNG supply system. The vessel is likely to be a newbuilding ordered by MOL for a charter to German trading company E.ON.

It will have a fuel supply device to run the ship on natural gas and a ‘partial re-liquefaction system’. When installed with ME-GI (MAN) engines, the system can improve ship’s fuel efficiency by 20 percent compared to existing DFDE (Dual Fuel Diesel Electric) engines. At the same time, the system and fuel technology offer cheaper materials and

operation costs. The expected up to USD15,000 per day operating cost saving at normal LNG carrier speed of 12 knot(22km/h) would be highly appealing for (ship) operators of LNG carriers.

The system will allow a reduced CO₂, NO_x and SO_x emissions by over 30 percent. The ship is required for delivery in 2018.

Contracts

Last year, DSME won 37 LNG ship building contracts while signing 5 more LNG ships contracts, so far this year. In January 2015 alone, the shipbuilder finalized a deal to build four 174,000 cubic meter carriers worth USD800m for Korea Line and Hyundai LNG.



Global and Chinese CNG & LNG vehicle industry 2009-2019 market report

Automotive and Transport Market Research has announced the release of estimates 2014-2019 market development of CNG & LNG fueled vehicle Industry. The report then analyzes the upstream raw materials, downstream clients, and current market dynamics of CNG & LNG vehicle Industry.

The Report Global and Chinese CNG & LNG fueled vehicle Industry, 2009-2019 Market Research Report provides information on pricing, market analysis, shares, forecast, and company profiles for key industry, market opportunity analysis and participants.

The author analyzes quantitatively 2009-2014 global and China's total market of CNG & LNG vehicle by calculating main economic parameters of each company.

The breakdown data of CNG & LNG fueled vehicle market are presented by company, by country, and by application.

The report firstly reviews the basic information of CNG & LNG vehicle including its classification, application and manufacturing technology.



In the end, the report makes some proposals for a new project of the vehicles industry and related new projects before evaluating its feasibility.

To get the full report, visit

www.proresearchreports.com/request-sample/343

Yangzijiang Shipbuilding to build two LNG carriers

With increase trade in global LNG market, more and more LNG projects and orders for LNG carriers are made.

Recently, Yangzijiang Shipbuilding announced that it has secured new shipbuilding orders from JHW Engineering & Contracting, a JACCAR Holdings unit, to build two 27,500 cubic meters LNG carriers.

The two LNG vessels are worth USD135 million, and scheduled to be delivered in 2017.

Research shows that global LNG market will grow from 238 million ton per annum (Mtpa) in 2014, to 420 Mtpa in 2020, and is expected to further increase to 500 Mtpa in 2025. The growth would be supported by constructions of new LNG carriers, in which Yangzijiang Shipbuilding plans to take necessary steps to make a solid launch in the new segment, according to Ren Yuanlin, Executive Chairman of the group.



China Yuchai's award winning LNG truck and other achievements



China Yuchai International Ltd. has won the “Fuel Efficient Heavy-Duty Truck of the Year 2014” with its “K-Gold” model C&C truck equipped with the YC6K1340N LNG engine at China’s largest annual commercial vehicle event- the “2014 Commercial Vehicles of the Year” competition.

The YC6K13N series of engines are produced by Y&C Engine a joint venture of China Yuchai’s main operating subsidiary, Guangxi Yuchai Machinery Company with Shenzhen City Jiusi Investment Management and Jirui United Heavy Industry a company jointly established by China International Marine Containers Group and Chery Automobile.

The YC6K1340N engine has the largest displacement and highest torque power among comparable natural gas engines in China. By utilizing lean-burn technology, it reduces average energy consumption by approximately 25 percent compared with diesel engines of similar size and power.

The model YC6K1340N is the only engine in China that utilizes the JACOBS in-cylinder brake technology, and has LNG braking power up to 17Kw/L.

The company also won a contract for NGVs supply in Beijing. Earlier in January, the firm announced that its main subsidiary, Guangxi Yuchai Machinery Company Limited (GYMCL), has won a competitive tender for the supply of a total of 635 units of National V natural gas and National VI diesel engines from Beijing Bafangda Express Bus Services Co., Ltd. (“Bafangda”), a subsidiary of the Beijing Public Transportation Group.

The contract is for 587 units of National V natural gas engines and 48 units of National VI diesel engines. The breakdown of natural gas engines is 237 units of engine model YC6L260N-50, 108 units of model YC6MK320N-50 and 242 units of model YC6K1336N-50. This contract represents the first purchase of YC6K13N engines in the Chinese bus market.

GYMCL is the largest natural gas engine supplier to Bafangda in tenders called in 2012 and 2014 supplying a total of 1,700 engines representing 35 percent of the total amount required under the 2 tenders. This is GYMCL’s second award through a competitive bidding process by the Beijing Public Transportation Group for National V natural gas engines since 2012, and the first award for the purchase of National VI diesel engines. The first large-scale applications of GYMCL’s National III, IV and V natural gas and National VI products all began with open tender purchases by the Beijing Public Transportation Group, representing the municipal bus service in Beijing.

China Yuchai International Limited, through its subsidiaries, manufactures and sells diesel and natural gas engines in China and internationally. The company’s engines are used in light, medium, and heavy-duty vehicles, as well as in generator sets, marine, and industrial applications. It also offers diesel power generators that are used in the construction and mining industries; special vehicles, which include waste transfer equipment, construction dump trucks, demountable carriage dump trucks, and pendular dump trucks; and diesel engine parts. The company distributes its products directly to auto plants and agents. The firm was founded in 1951 and is based in Singapore.

Iran's gas pipeline development and potential CNG price changes

East Azarbaijan Gas Company (EAGC) was reported to laid down 702 km of gas network in Iran between March 21 and December 21, 2014. The gas mainly distributed for domestic/households users.

Valiollah Dini, managing director of the company, said that during this period, the number of users of the national gas network grew by 57,974, of which 39,382 pertained to urban areas and 18,592 to rural areas. Additionally, 86 villages joined the national gas network in the East Azarbaijan province of Iran.

Dini also indicated that EAGC planned to commence gas supply to four CNG stations. Currently, 152 CNG stations across the province are connected to the national gas network. The province consumed 4.29 billion cubic meter of gas during the same period.

On the other hand, to ensure locally produced gas will be kept using in a major volume by the transport sector and to reduce petrol demand, the country's central government is reported to plan to reduce CNG price. Iranian oil minister has reportedly agreed that CNG price to be reduced by 10 percent in the future, following slump down in the global petrol prices.



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Shell Eco-Marathon Asia 2015 commenced

On February 27th, at the historic Luneta Park in Manila, Asia's most fuel-efficient vehicles built by students were flagged off, signalling the official start of Shell Eco-marathon Asia 2015. The annual competition challenges the region's aspiring young engineers to build vehicles of the future that can go the farthest on the least amount of energy. It brings together current and future leaders, along with a broader public and encourages debate around sustainable solutions to the challenge of rising global energy demand.

The starting grid is set for the opening ceremony of the Shell Eco-marathon Asia 2015 in Manila

As the Shell Eco-marathon enters its 30th year globally, the sixth Asian edition of the student innovation competition welcomes new entrants from Australia, Bangladesh, Oman and Saudi Arabia for the first time in its history. A public festival celebrating innovative thinking and future mobility, Shell Eco-marathon will be held for the second time at a specially designed street circuit in Manila.

"Shell Eco-marathon is a crucible of innovation. A place where good ideas on energy efficiency and smart design can get their first real-world trials. Maybe one of these students will go on to design the car of the future," said Shell's Chief Human Resources and Corporate Officer Hugh Mitchell, as he led the flag-off ceremony.

A future generation of engineers and scientists, totalling 127 student teams from 17 countries all across Asia, the Middle East and Australia are competing at Shell Eco-marathon Asia until March 1, when the final results would be announced at an awards ceremony at the Manila Hotel. Countries participating include Australia, Bangladesh, Brunei Darussalam, Egypt, India, Indonesia, Japan, Malaysia, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Thailand, United Arab Emirates, and Vietnam.

Student teams will participate in either the Prototype or UrbanConcept vehicle categories of the competition and in any of the following energy types: gasoline, diesel, alternative gasoline (ethanol 100), alternative diesel (Shell Gas-to-Liquid or fatty acid methyl ester), battery electric, hydrogen fuel cell or Compressed Natural Gas (CNG), a new energy type introduced for the 2015 competition. Shell Eco-marathon Asia 2015 will see three teams using CNG as a source of energy for their vehicles.

Shell Fan Zone unveiled

A new attraction at this year's Shell Eco-marathon is the Shell Fan Zone where visitors can get close to the track, learn more about the energy challenge, grab a bite to eat and possibly meet celebrity drivers and personalities.

Visitors also have a chance to view educational exhibits that



explore what the world and cities might look like in the future. At the Shell FuelSave Fact or Fiction Celebrity Driving Challenge this morning, Philippines' Bianca Gonzalez was announced the winner after she recorded 57km/l on the Shell Eco-marathon track. For this challenge, celebrities from the region drove the Shell Urban Concept Car, a fuel-economy vehicle of the future that resembles today's road cars. Visitors also witnessed an interactive mythbusting demonstration at the Shell Fan Zone.

Shell Eco-marathon 2015 shows Shell's commitment to helping the world meet its growing energy needs in a responsible way, bringing together students, partners and the public. It is held in partnership with the Philippine Government Department of Tourism and the City of Manila. Its Global Partners include HP (Official Global Information Technology (IT) Partner), Michelin (Official Global Paddock Partner and Tyre Supplier), The Linde Group (Official Global Paddock Partner) and South-west Research Institute (Official Global Paddock Partner). Local private sector partners are Unilever Philippines, Solane, Coca-Cola, Globe and Hyundai.

About Shell Eco-marathon

Shell Eco-marathon began in 1939 at a Shell research laboratory in the United States as a friendly wager between scientists to see who could get the most miles per gallon from their vehicle. The winner of that contest barely achieved 50 mpg (21 km/l), and from these humble origins, a more organized competition evolved. In 1985 in France, Shell Eco-marathon as we know it today was born. In April 2007, the Shell Eco-marathon Americas event was launched in the United States, and in 2010, the inaugural Shell Eco-marathon Asia was held in Malaysia. Malaysia hosted Shell Eco-Marathon Asia until 2013. Since 2014, the event is being held in Manila, Philippines, which will continue to host the event until 2016.

From the press release of Shell Global

Broadwind-Safe: compression packaging starts for US market

With an installed base of over 3,500 compression packages worldwide, Safe SpA paired up with Broadwind Energy late last year to form a strategic partnership around delivering CNG compression packages to the North American market. "We are interested in leveraging our experience in CNG throughout the world to deliver reliable and cost effective CNG compression solutions to meet the growing demands of the U.S. market. Partnering with Broadwind Energy enables us to assure customers that spare parts are readily available and a nationwide service network stands behind the product line," stated Mario Pirraglia, President of Safe North America.

Last week, the companies announced plans to commence manufacturing of two compression packages, which will feature 250 HP motors, an inlet pressure range of 15-45 psi and 540 SCFM output. Packaging will take place at Broadwind Energy's Texas facility with completion scheduled for early June.

"This is an important step in our growth plans for North America. We are building the stock packages to allow cus-



tomers the ability to see the features of our equipment first hand and demonstrate our commitment to delivering a high quality turn-key compression packaged in North America," said Joseph Reisinger, Vice President of Product Management at Broadwind Energy.

Source: Safe SpA / Broadwind Energy.

Natural gas vehicles sales likely to reach 3.9 million annually by 2024

A new report from Navigant Research examines the global NGV market, including forecasts for vehicle sales and on the road, refueling stations, natural gas consumption, and CNG cylinders through 2024. According to the analysis, sales of NGVs are expected to grow from 2.3 million annually in 2014 to 3.9 million in 2024.

Increasingly stringent fuel economy and tailpipe emissions standards in major automotive markets are driving automakers to provide alternatives to traditional gasoline- and diesel-fueled internal combustion engines. For many customers, particularly high-mileage fleet operators and consumers in regions with high retail prices for liquid fuels, NGVs offer an excellent option for reducing both operating costs and CO2 emissions.

"NGV markets in a number of regions are expected to grow significantly over the next decade, particularly China, which is grappling with serious air pollution issues that are affecting quality of life in major urban areas," says Sam Abuelsamid, senior research analyst with Navigant Research.

The report "Natural Gas Vehicles" examines the global market for NGVs, with a focus on passenger cars, light duty



trucks, medium/heavy duty trucks and buses, and commercial vehicles. The study provides an analysis of the key factors expected to influence demand for NGVs, including economic growth, fuel prices, infrastructure availability, acquisition costs, regulations, and technical issues. Global market forecasts are broken down by vehicle segment and region, extended through 2024. The study also analyzes how the market and technology issues will affect automobile and truck manufacturers, suppliers of NG engines, fuel storage, and delivery hardware, and the companies that convert liquid-fueled vehicles to NG.

Source: Navigant Research.



Beijing Public Transport adds over 1,500 new natural gas buses

Foton AUV has signed a major agreement for a total of 1909 AUV buses, including alternative fuel and conventional fuel units, with Beijing Public Transport Company and its subsidiary company, Beijing Bafangda Transport Company. Under the contract, Foton will deliver 1,561 natural gas buses. The order from Beijing Public Transport Co, Ltd. includes 291 16-meter city buses (BJ6160C6CCD) and 20 12-meter double-decker city buses (BJ6128C8BCD), all powered by LNG, as well as 150 12-meter buses (BJ6123C7BTD-1) powered by CNG.

Moreover, Beijing Bafangda Transport Company has ordered 635 12-meter city buses (BJ6123C7BTD-1), 302 13.7-meter tourism buses (BJ6147C8BTD), and 163 12-meter tourism buses (BJ6127C8BTB), all powered by LNG.

According to Foton, the delivery of these buses will not only further promote Foton's new energy products in domestic and overseas market, but will also effectively reduce the emission of PM2.5 that fundamentally improves air quality and protect the environment of urban areas.

Source: *China Buses*

First two public hydrogen filling stations open in Nagoya and Toyota

Last month Air Liquide celebrate the completion of these facilities, which are the first public-use hydrogen filling stations for Fuel Cell Electric Vehicles in the central Nagoya area and in Toyota City, respectively, located in the Aichi Prefecture of Japan. They will make it possible to fill Fuel Cell Electric Vehicles in less than 5 minutes per car, offering an autonomy that can reach up to 500km depending on the model. The new stations were developed in a collaborative joint venture between Air Liquide Japan and Toyota Tsusho Corp., Toyotsu Air Liquide Hydrogen Energy. Air Liquide Japan was in charge of the design and installation of these stations which were designed using Air Liquide group's expertise acquired from installing more than 60 hydrogen filling stations around the world.

Prior to the ceremony, on January 18, Air Liquide welcomed Michel Sapin, French Minister of Finance and Public Accounts at the new Nagoya station. He praised the joint-venture of Air Liquide and Toyota Tsusho as a showcase of innovative partnership and a valuable contribution to the fight against global warming.

Air Liquide is actively involved in the development of the hydrogen energy industry worldwide, already operating hydrogen filling stations for the general public in Europe, including Rotterdam in the Netherlands, Düsseldorf in Germany, and in several cities in Denmark as well as in the United States. Very present in this sector in Japan, the Group has already built three hydrogen stations, in Tokyo, Kawasaki and Saga, currently in test phase.

Source: *Air Liquide*

Major car manufacturers to jointly enhance hydrogen infrastructure

Toyota, Nissan and Honda have agreed to work together to help accelerate the development of hydrogen station infrastructure for fuel cell vehicles. Specific measures to be undertaken by the three manufacturers are yet to be determined.

For hydrogen-fueled FCVs to gain popularity it is not only important that attractive products be launched -hydrogen station infrastructure must also be developed. At present, there are companies making every effort to build such an infrastructure, but they face difficulties in installing and operating hydrogen stations while FCVs are not common on the road.

Following the formulation of its Strategic Road Map for Hydrogen and Fuel Cells in June 2014, the Japanese government has highlighted the importance of developing hydrogen station infrastructure as quickly as possible in order to popularize FCVs. Consequently, the government is not only supporting the installation of hydrogen stations by means of subsidies, but has also resolved to introduce a range of additional policies aimed at promoting activities that generate new demand for FCVs, including partially subsidizing the cost of operating hydrogen stations. The three automobile manufacturers hope to popularize FCVs and ensure that it will be easy to refuel them and, consequently, they will give careful consideration to concrete initiatives, such as underwriting a portion of the expenses involved in the operation of hydrogen stations.

FCVs are expected to play a central role in the drive towards establishing a hydrogen society. Toyota, Nissan and Honda are aiming to contribute to bringing about such a society through ensuring the widespread use of fuel cell vehicles.

Source: *Toyota Motor Corporation.*

Japan: alliance will boost hydrogen fueling for material handling sector

Air Products and Suzuki Shokan Co., Ltd. (an industrial gas company based in Tokyo) have signed an “Alliance Agreement” to work together on the design, construction and operation of hydrogen stations for use in fueling the material handling vehicle market in Japan. They will take Air Products’ technology and work jointly to make any needed infrastructure modifications in order to meet Japanese regulations. The companies also agreed to a standard Equipment, Engineering and License for Suzuki Shokan’s purchase and use of key equipment for the implementation of Air Products’ SmartFuel® hydrogen fueling station technology.

“We have a great deal of experience supporting the material handling market with hydrogen fueling technology and related infrastructure. Japan’s keen interest in hydrogen fueling for the automotive market provides a natural extension to hydrogen fueling for material handling. Working with Suzuki Shokan, we can meet the needs of this market,” said Ed Kiczek, global business director – Hydrogen Energy Systems at Air Products. Kiczek added that the Alliance is already in discussion with multiple high-profile customers for the first deployment.

“We believe that the execution of this agreement is a significant step towards the upcoming hydrogen society. Suzuki Shokan possesses hydrogen handling technology and know-how through a long history of supplying the hydrogen business. Such technology and know-how includes engi-



neering, equipment and parts design, construction of piping and knowledge about laws and safety regulations. In conjunction with Air Products’ advanced technology, this will make fuel cell powered forklifts steadily accepted by the Japanese market,” said Yoji Koguchi, managing director in charge of Toyota Factory.

Koguchi added that the driving power for the material handling vehicle (forklift) market in Japan is being shifted from internal combustion engines to batteries which are considered environmentally cleaner. Development and practical use of fuel cells in material handling applications have already started in the country.

Source: Air Products

Eurasian LPG market speeds up, reaching \$40 billion by 2019

According to a report by MicroMarket Monitor, the liquefied petroleum gas market is expected to reach \$40 billion by 2019, at CAGR of 3.2% from 2014 to 2019. Russia is one of the major countries in this sector, followed by the Netherlands in 2014, and is not only expected to garner the largest share of the Eurasia market, but is also projected to grow at the fastest CAGR during the forecast period.

The residential/commercial application is expected to account for maximum share in this region. However, the vehicle fuel application of LPG is estimated to grow at a CAGR of 4.9% from 2014 to 2019. Other major applications of LPG in Eurasia include chemical, and industrial, among others. The development of the LPG industry is driven by factors such as environmental concerns, low carbon emission and energy-efficiency. Besides, wide applicability, government promotion of its implementation and ease of use are also some of the major reasons accelerating the growth of this market. As of 2014, the Eurasia liquefied petroleum gas market is

dominated by global companies, such as Shell, Exxon Mobil, BP, Gazprom, and Phillips 66. New product launches, partnerships, agreements, collaborations, and joint ventures are the major strategies adopted by most market players to boost the market growth.

Source: MicroMarket Monitor



Asian NGV statistics

Asia NGV statistics

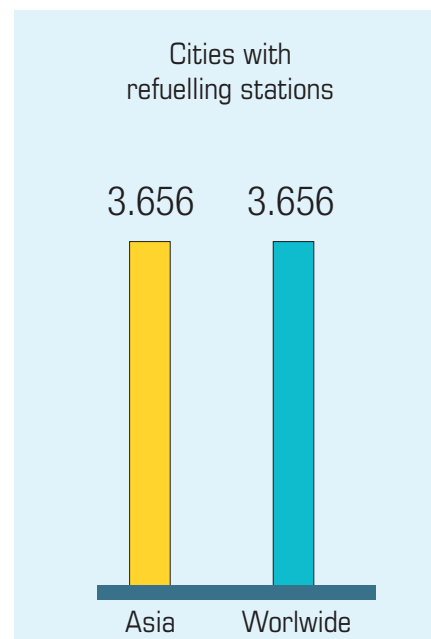
| Country | Natural Gas Vehicles | | | | | Refuelling stations | | | | VRA | Monthly gas consumption (M Nm ³) | | | Last update | |
|----------------------|----------------------|-------------------|------------------|----------------|------------------|---------------------|---------------|------------|--------------|------------|--|---------------------------|----------------------|-------------|------|
| | Total | Cars/LDVs | MD/HD buses | MD/HD trucks | Others | Total | Public | Private | Planned | | Average consumption (actual report) | The consumption in theory | Reported consumption | | |
| Iran | 4,000,000 | 3,993,948 | 6,036 | 16 | | 2,220 | 2,185 | 35 | 800 | | 7300,00 | 737,03 | 990,5% | July | 2014 |
| China | 3,994,350 | 2,587,288 | 1,025,531 | 331,531 | 50,000 | 6,502 | 6,302 | 200 | 2,913 | 9 | | 3810,03 | 0,0% | October | 2014 |
| Pakistan | 3,700,000 | 3,520,000 | | | 180,000 | 2,997 | 2,997 | | | | | 642,60 | 0,0% | August | 2014 |
| India | 1,800,000 | 500,000 | 300,000 | 200,000 | 800,000 | 936 | 936 | | | | 163,21 | 1190,00 | 0,0% | December | 2013 |
| Thailand | 462,454 | 393,057 | 13,367 | 54,268 | 1,762 | 497 | 471 | 26 | | | | 154,58 | 0,0% | September | 2014 |
| Uzbekistan | 450,000 | 450,000 | | | | 213 | 213 | | 50 | | | 81,00 | 0,0% | June | 2013 |
| Armenia | 244,000 | 192,000 | 17,300 | 34,700 | | 345 | 9 | 336 | | | 26,53 | 114,22 | 23,2% | December | 2011 |
| Bangladesh | 220,000 | 145,304 | 10,000 | 27,000 | 37,696 | 585 | 585 | | | 13 | 91,55 | 79,64 | 115,0% | April | 2013 |
| Russia | 90,050 | 65,000 | 10,000 | 15,000 | 50 | 253 | 211 | 42 | 15 | 4 | 33,75 | 53,71 | 62,8% | July | 2013 |
| Georgia | 80,600 | 51,000 | 6,000 | 5,000 | 18,600 | 100 | 100 | | 25 | | | 32,11 | 0,0% | November | 2013 |
| Malaysia | 55,999 | 55,345 | 594 | | 60 | 184 | 182 | 2 | | 10 | 14,80 | 11,75 | 126,0% | October | 2013 |
| Japan | 42,590 | 16,564 | 1,560 | 22,516 | 1,950 | 314 | 274 | 40 | | 612 | | 25,77 | 0,0% | March | 2013 |
| South Korea | 40,532 | 8,203 | 31,069 | 1,257 | 3 | 201 | 101 | 100 | | | 93,00 | 95,69 | 97,2% | November | 2014 |
| Myanmar | 27,137 | 23,658 | 3,475 | 4 | | 45 | 45 | | | | | 14,69 | 0,0% | September | 2014 |
| Tajikistan | 10,600 | 10,600 | | | | 53 | 53 | | | | 4,13 | 1,91 | 216,5% | December | 2007 |
| United Arab Emirates | 4,179 | 4,129 | 50 | | | 18 | 17 | 1 | 54 | 1 | 1,05 | 0,89 | 117,6% | December | 2014 |
| Kyrgyzstan | 6,000 | 6,000 | | | | 6 | 6 | | | | 0,60 | 1,08 | 55,6% | December | 2007 |
| Indonesia | 5,690 | 4,850 | 570 | 20 | 250 | 11 | 11 | | 4 | | | 2,61 | 0,0% | November | 2013 |
| Singapore | 4,638 | 4,618 | 20 | | | 3 | 2 | 1 | | | 1,03 | 0,89124 | 1,15569319 | October | 2013 |
| Turkey | 3,850 | 1,850 | 2,000 | | | 14 | 8 | 6 | | 35 | 4,20 | 6,33 | 2 | December | 2011 |
| Australia | 3,110 | 25 | 2,060 | 275 | 750 | 52 | 5 | 47 | 10 | 130 | | 5,99 | 66,3% | June | 2013 |
| Moldova | 2,200 | 2,200 | | | | 24 | 24 | | | | 0,40 | 0,40 | 0,0% | Septemebr | 2011 |
| Afghanistan | 1,701 | 300 | 1 | | 1,400 | 2 | 2 | | | | | | 101,0% | August | 2013 |
| Vietnam | 462 | 400 | 50 | 12 | | 7 | 7 | | | | | | | July | 2012 |
| New Zealand | 201 | 19 | 61 | 84 | 37 | 14 | | 14 | | | | 0,26 | | December | 2010 |
| Qatar | 76 | 1 | 75 | | | 1 | | 1 | | | | 0,23 | 0,0% | September | 2013 |
| Philippines | 20 | | 20 | | | 1 | | 1 | | | | 0,06 | 0,0% | November | 2013 |
| Kazakhstan | 20 | | 20 | | | 1 | 1 | | 90 | | | | 0,0% | November | 2013 |
| Turkmenistan | | | | | | 1 | 1 | | | | | | | November | 2009 |
| Greater Asia | 15,250,459 | 12,036,359 | 1,429,859 | 691,683 | 1,092,558 | 15,600 | 14,748 | 852 | 3,961 | 814 | 7,734 | 7,063 | 109,5% | | |

Notes:

The column 'theoretical monthly consumption' is calculating total monthly consumption if cars consume 180, buses 3000, trucks 800, and other vehicles 50 Nm³ per month. There is, of course, a huge difference between different truck types. A 44 ton truck may consume up to 8000 (not 800) Nm³ per month.

Cities with CNG refuelling stations

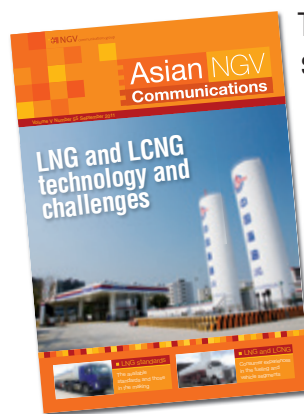
| Country | Number of Cities | Last update |
|----------------------|------------------|-------------|
| Iran | 597 | Nov. '11 |
| Russia | 198 | May '12 |
| China | 100 | May '12 |
| Thailand | 54 | May '14 |
| South Korea | 52 | Nov. '13 |
| Pakistan | 50 | Apr. '08 |
| India | 42 | Nov. '10 |
| Armenia | 37 | Mar. '08 |
| Malaysia | 12 | Mar. '13 |
| Bangladesh | 8 | Nov. '05 |
| Myanmar | 4 | Oct. '11 |
| United Arab Emirates | 4 | Jul. '11 |
| Australia | 3 | Nov. '09 |
| Indonesia | 2 | Sept. '08 |
| Turkey | 2 | Aug. '04 |
| Philippines | 1 | Oct. '05 |
| Singapore | 1 | Jul. '05 |
| Taiwan | 1 | Apr. '05 |
| Total | 3,656 | |



Fuel prices

| Country | Premium Gasoline (Euro/litre) | Regular Gasoline (Euro/litre) | Diesel (Euro/litre) | CNG (Euro/Nm3) | CNG price equivalent per litre gasoline | CNG price equivalent per litre diesel | Date |
|-------------|-------------------------------|-------------------------------|---------------------|----------------|---|---------------------------------------|--------|
| Afganistan | 0,73 | | | 0,5 | 0,45 | 0,51 | nov-12 |
| Armenia | 0,96 | 0,91 | 0,83 | 0,38 | 0,34 | 0,39 | sep-11 |
| Australia | 0,98 | | 1,02 | 0,69 | 0,62 | 0,71 | nov-14 |
| Bangladesh | 0,52 | 0,49 | 0,34 | 0,18 | 0,16 | 0,18 | sep-09 |
| China | 0,96 | 0,88 | 0,87 | 0,50 | 0,45 | 0,51 | nov-14 |
| Georgia | 0,91 | 0,88 | 0,87 | 0,48 | 0,43 | 0,49 | nov-14 |
| India | 0,93 | | 0,79 | 0,56 | 0,50 | 0,57 | nov-14 |
| Indonesia | 0,65 | 0,56 | 0,43 | 0,21 | 0,19 | 0,22 | nov-14 |
| Iran | 0,25 | 0,20 | 0,13 | 0,02 | 0,02 | 0,02 | abr-14 |
| Japan | 1,60 | 1,49 | 1,30 | 1,05 | 0,81 | 0,89 | jun-12 |
| Malaysia | 0,55 | | 0,52 | 0,20 | 0,13 | 0,21 | nov-14 |
| Pakistan | 0,92 | 0,74 | 0,80 | 0,44 | 0,39 | 0,45 | nov-14 |
| Philippines | 0,76 | | 0,60 | 0,26 | 0,23 | 0,27 | ene-10 |
| Russia | 0,71 | | 0,73 | 0,27 | 0,24 | 0,28 | jun-13 |
| Singapore | 1,26 | | 0,92 | 0,88 | 0,79 | 0,90 | nov-14 |
| South Korea | 1,30 | | 1,15 | 0,80 | 0,61 | 0,68 | nov-14 |
| Thailand | | 0,66 | 0,68 | 0,26 | 0,23 | 0,26 | feb-15 |
| Turkey | 1,86 | | 1,62 | 1,37 | 1,23 | 1,40 | sep-14 |
| Uzbekistan | 0,80 | 0,72 | 0,68 | 0,23 | 0,21 | 0,24 | oct-11 |
| Vietnam | 1,25 | 1,17 | 0,92 | 0,89 | 0,80 | 0,91 | mar-11 |

Notes: *In these countries sales are measured in kg. The conversion factor depends on the normal density of gaseous natural gas in each country. The default value used is 0.73 kg/Nm3.



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