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Africa NGV targets and the current status South Africa

South Africa

Despite of the presently modest NGV statistics, South Africa is one of the most active countries in implementing its NGV program. The nation is seen by many, including natural gas vehicle and station equipment suppliers and OEM NGVs, as the most promising country to operate a successful NGV adoption project and be the home to a productive NGV business of the region.

By the end of the first quarter of 2014, South Africa has almost 300 NGVs, consisting of 121 cars/LDV (including company cars, taxis and minibuses), 136 MD-HD buses and 1 other type of vehicle. By that time, at least 3 CNG stations were in operation with more under construction. In September 2014, 800 minibuses were reported to operate on bifuel petrol/CNG, bringing the NGV population figure to almost 1,000 units.

Target to expand its Compressed Natural Gas (CNG) filling network is underway with mother-daughter stations and virtual filling stations system. The South African NGV stakeholders are keen to see more cars and taxis, public bus fleets, garbage trucks to switch to this “clean” and cheaper fuel. It is expected that old taxis will be replaced by bifuel cabs, while the tourism sector is encouraged to switch to CNG system. Support from the government/municipalities is also available; with biomethane for transport potential being explored.

Private company CNG Holdings is also in the process of converting 1,000 taxis to run on CNG. It aims at adding CNG dispensing facilities at its existing petrol/diesel stations. The project is made possible thanks to Industrial Development Corporation’s R120-million funding. The financing would be used to complete Phase 1 of the CNG Holdings’ Group roll-out strategy, and R100-million expansion program to promote CNG as an affordable energy alternative for industrial users and fleet owners.

As per the Group’s feasibility study, industrial customers would get an economic saving of between 10 and 25 percent on operating fuel and energy costs, and a saving of between 25 and 35 percent in running (vehicle operation) fuel costs when using natural gas.

Nigeria

Meanwhile, initiator and main drivers of NGVs adoption in Nigeria, the Nigerian Gas Company (NGC) and NIPCO Plc, have decided to invest N17 billion in CNG filling station network expansions.

The investment will be used to build 35 CNG dispensing facilities across Nigeria before the end of 2015. To date, NIPCO had built 7 CNG stations under a Joint Venture company called Green Gas. Meanwhile, ten more stations are currently at advanced stages of construction.

Across the nation, their other CNG stations are also at various stages of design and construction. Eight are in various express ways in Benin City and one in Delta State. Together with the Ibafo project in Ogun state, these facilities will be welcome by NGV operators and owners in Benin and Lagos Cities and surroundings. With Federal Government support and the Nigerian National Petroleum Corporation (NNPC) effort, more than 1,500 petrol cars had been converted to bifuel CNG/petrol version. Almost 3,800 vehicles - of which almost 3,500 are cars/LDVs, 25 MD-HD buses, 287 MD-HD trucks, and 34 other types of vehicles - were converted to bifuel and DDF diesel/CNG system.

Target is set that, by next year, more than 25,000 vehicles will use CNG. Beyond this, around 50,000 vehicles from the private sector are expected to be converted to NGV system by 2017/2018. Borkit International Gas and Energy Company, a subsidiary of the Dangote Group, has budgeted N16.8 billion investment for this CNG adoption project. Also, the public transport system was mentioned as a target of DDF bus conversion. Local NGV stakeholders are eyeing on the potential procurement of 1,000 OEM CNG buses for public commuters. In the station segment, NIPCO alone initially targeted to install CNG facilities in its 5,000 existing fuel stations - or build dedicated CNG stations, and open vehicle conversion workshops.

The Federal Ministry of Petroleum Resources are in the process of opening new CNG franchise in all the 36 states of the federation around 50km gas pipeline planned to be laid to support this program.

The Managing Director of NIPCO, Venkataraman Venkatapathy, stated that CNG had become a preferred fuel.
alternative to petroleum fuels as it is colorless, odorless, non-toxic, has a cheaper price tag, requires less maintenance costs, and is less polluting. He underlined that CNG was not a liquid fuel and was not the same as LPG, which generally consists of propane and butane in liquid form. 

It is widely known in the gas automotive industry, that, CNG and LPG cylinders are NOT the same and cannot be used interchangeably. CNG used in vehicles must be stored (in gas form) at a high pressure of 250-200 bar while LPG is stored (in liquid form) at a pressure of only about 2-15 bar. The containers to store the fuels are absolutely unalike from each other and have different characteristics and capabilities. An LPG cylinder for automotive use is designed to be able to withhold maximum 30 bar of pressure, while a CNG cylinder has a design pressure of 450-600 bar. So, again, in the transport sector, CNG has an operating pressure way higher than LPG: 200 bar for CNG versus 8 bar for LPG. Meaning, the storage vessel for LPG CANNOT be used to store CNG (as LPG cylinder will not be able to withhold the high pressure of highly COMPRESSED natural gas). Using an LPG cylinder to store CNG will lead to cylinder explosion (mostly happened during refueling of gas at the station).

Back to Nigeria, Venkatapathy said that NGV stakeholders in the country are encouraging key companies in Benin City to use CNG for their vehicles and to power their generator sets. Furthermore, the Federal Government is also looking into ways to solve issues related to conversion cost and CNG dispensing network (expected with funding, favorable schemes/incentives, etc). Meanwhile, NIPCO is conducting awareness campaigns to motorists, about the benefits and the Return on Investment of the vehicle conversion.

Egypt

The country that had almost 200,000 NGVs and 172 CNG filling stations by end of last year is aiming at having 300,000 NGVs and 390 CNG filling across the country. CNG for transport adoption is extended to a wider region, with more types of vehicles beyond cars/taxis, fleet buses and trucks to be involved. Wider range of customers is also targeted to join the “clean” NGV program beyond the “traditional” customers (gas and public transport companies).

Tanzania

The nation target is to convert 8,000 government vehicles to bi-fuel petrol/CNG system with biomethane industry being explored to serve transport and other sectors. USD 55.1 billion funding was mentioned to be used to improve natural gas for CNG filling stations, domestic (homes) use, and industry. Fifteen filling stations were originally planned to be constructed in 2012-2015, as well as 65 km gas pipelines. The Tanzania Petroleum Development Corporation will partner with Pan Africa Energy Tanzania Ltd to activate the natural gas program, initially targeting 200 vehicles, 100 households, 10 hotels and institutions as well as three CNG filling stations.

Mozambique

Five hundred LDVs/cars, 150 MDHD buses and 11 other types of vehicles were registered to be powered by CNG-wth 2 filling facilities- in July 2012 in Mozambique. The country also employs OEM CNG buses made by Caio Africa. Additionally, Maputo City’s public transport -TPM- operator also bought five OEM CNG buses from China in 2010, but those were not yet designed to cope with Mozambique’s climate and road condition. TPM’s initial idea was to import 100 buses running on natural gas. Local company, Auto-Gas, has invested about 4 million USD for vehicles conversions and gas supply network. The country’s total target is to acquire 150 CNG buses and convert 2,000 minibuses for public transport in Maputo and Matola Cities, and to convert the government fleet.

Tunisia

Although currently not being so active, Tunisia was reported to target to have 100 OEM CNG buses and increase its bi-fuel car fleet. Latest report on NGV statistics by end 2007 shows 34 NGVs and 1 CNG station in this country.

Algeria’s two stages NGV target -1st stage in 2007 to 2011 and 2nd stage in 2012 to 2025- was estimated to involve at least DZD 28 billion investment to convert 175 buses and 14,000 taxis, purchase 500 OEM CNG buses, build 152 CNG filling stations in major cities, open four conversion workshops, parking and maintenance service for urban transport fleet. As per December 2011, only 160 NGVs with 3 filling stations were in operation in this country. In September 2014, the figures went up to 150 cars/LDVs plus 100 CNG buses (Medium-Heavy Duty) and soon there will be another station opened in a new area- Rouiba. Nevertheless, this world’s 4th largest gas exporting country is keen to revive its NGV program with Sonatrach and Naftal as some of the main actors apart from the ETUSA public bus operator.

Other African countries are also conducting studies to employ CNG in their transport fleets.
NGV doelwitten en de huidige markt status in Afrika

Zuid-Afrika

Onthans de “momenteel” bescheiden NGV statistieken, Zuid-Afrika is een van de meest actieve landen in de uitvoering van NGV projecten. Het land wordt gezien door velen-waaronder leveranciers van onderdelen van aardgas voertuigen en station en OEM NGVsals het meest veelbelovende land voor NGV sector.

Tegen het einde van het eerste kwartaal van 2014, Zuid-Afrika heeft bijna 300 NGVs: 121 auto’s / LDV (inclusief bedrijfsauto’s, taxi’s en minibussen), 136 MD-HD bussen en 1 ander type van voertuig. Tegen die tijd, minimaal 3 CNG stations waren operationeel, met paar meer in aanbouw. In september 2014, werden 800 bifuel benzine / CNG minibussen zijn in gebruik, waardoor het aantal van NGV werd bijna 1.000.

Volgens het industriële doel, Compressed Natural Gas (CNG) tankstation netwerk zal worden verhoogd met de moeder-dochter en virtuele tankstation systeem. De Zuid-Afrikaanse NGV stakeholders willen meer auto’s, taxi’s, openbaar bussen, en vuilniswagens te zien met deze “schone” en goedkopere brandstof. De verwachting is dat de oude taxi’s zullen worden vervangen door bifuel taxi’s. Bovendien, de toeristische sector wordt gestimuleerd om over te schakelen naar CNG. Steun van de overheid / gemeenten is ook beschikbaar; met biomethaan-voor-transport potentieel wordt onderzocht.

Particulier bedrijf CNG Holdings Groep is ook in het proces om 1.000 taxi’s te converteren naar CNG. Daarnaast, het bedrijf wil CNG faciliteiten installeren op hun bestaande benzine / diesel tankstations. Het project wordt mede mogelijk gemaakt door Industrial Development Corporation financiering van R120-miljoen. De financiering zal worden gebruikt om project fase 1 van de Groep te realiseren en R100-miljoen zal gebruikt worden om uitzonderingsprogramma te voltooien zodat CNG gebruikt worden als een betaalbaar alternatief energie voor industriële gebruikers en fleetowners. Volgens de feasibility studie van de Groep, zal de industriële klanten een economische besparing te krijgen van tussen de 10 en 25 procent op de operationele kosten van brandstof en energie, en een besparing van tussen de 25 en 35 procent in het operationeel van brandstof kosten (van het voertuig) bij gebruik van aardgas.

Nigeria

Ondertussen, initiatiefnemer en het belangrijkste drivers van NGVs adoptie in Nigeria, de Nigeriaanse Gas Bedrijf (NGC) en NIPCO Plc, hebben besloten om N17 miljard investeren in het uitbreiden van CNG-tankstation netwerk.

De investering zal worden gebruikt om 35 CNG tankstations in het land te bouwen voor het einde van 2015. Tot op heden had NIPCO 7 CNG tankstations onder een joint venture bedrijf Groen Gas-gebouwd. Ondertussen, tien meer stations zijn momenteel in een vergevorderd stadium van de bouw.

In het hele land, hun andere CNG-stations zijn ook in verschillende stadia van het ontwerp en aanbouw. Acht zijn in verschillende snelwegen in Benin City en een in Delta State.

Samen met de IBAFO project in Ogun staat, zullen deze faciliteiten welkom zijn door NGVs eigenaars in Benin en Lagos Steden en omgeving. Met de steun van de federale regering en de Nigerian National Petroleum Corporation (NNPC), meer dan 1.500 benzineauto’s zijn omgezet naar bifuel CNG / benzine versie. Bijna 3.800 voertuigen-voor CNG stations zijn gepland voor het einde van 2015.

Doelstelling wordt gesteld dat volgend jaar meer dan 25.000 voertuigen zullen op CNG rijden. Afgezien van deze, zijn ongeveer 50.000 voertuigen van de particuliere sector naar verwachting gepland omgezet in NGV systeem in 2017/2018. Borkit International Gas and Energy Company, een dochteronderneming van de Dangote Group, heeft N16.8 miljard investering voor dit CNG project gezet. Ook is het openbaar vervoer geraadpleegd als doelwit
van DDF bus conversie. Lokale NGV stakeholders bekeek over de mogelijke aanschaf van 1.000 OEM CNG bussen voor het openbaar vervoer. In het station segment, NIPCO wil CNG faciliteiten installeren in zijn 5.000 bestaande benzine/diesel tankstations - of bouw dedicated CNG-stations, en open garages/workshops om voertuigen te converteren naar CNG systeem.

Het federale ministerie van Petroleum Resources zijn in het proces om nieuwe CNG station franchise in alle 36 staten van de federatie te openen. Bovendien, ongeveer 50km gaspijpdealing is geplant om te bouwen om dit programma te ondersteunen.

De Managing Director van NIPCO, Venkataraman Venkatapathy, verklaarde dat CNG een voorkoersalternatief voor petroleum brandstoffen was geworden omdat het is kleurloos, geurloos, niet-toxisch, heeft een goedkoper prijskaartje, vergt minder toxisch, heeft een goedkoper die is kleurloos, geurloos, niet-toxisch, heeft een goedkoper

Het is algemeen bekend in de gasvoor-automotive-industrie, dat CNG en LPG zijn niet hetzelfde en kunnen niet door elkaar worden gebruikt. CNG voor voertuigen worden opgeslagen (in gasvorm) bij een hoge druk van 200-250 bar terwijl LPG wordt opgeslagen (in vloeibare vorm) bij een lage druk van slechts ongeveer 2-15 bar. De containers van het brandstoffen absoluut verschillend van elkaar en hebben verschillende kenmerken en mogelijkheden. Een LPGcilinder voor gebruik in auto’s is ontworpen om maximaal 30 bar druk te kunnen houden, terwijl een CNG cilinder heeft een ontwerp druk van 450-600 bar. Dus, in het transport sector, CNG heeft een werkdruk veel hoger dan LPG: 200 bar voor CNG versus 8 bar voor LPG. Het betekent dat opslagt voor LPG KAN NIET wordt gebruikt voor het opslaan van CNG (want LPG cilinder zal niet in staat zijn om de hoge druk van het sterk gecomprimeerde aardgas te onthouden). Als CNG is ongeslaagd in een LPG tank, het leidt tot cilinder explosie zal zijn (meestal gebeurde tijdens het tanken van het gas op het tankstation).

Terug naar Nigeria, Venkatapathy zei dat NGV stakeholders in het land stimuleren belangrijke bedrijven in Benin City om CNG te gebruiken voor hun voertuigen en hun generatoren. Bovendien is de federale regering ook op zoek naar manieren om de problemen in verband met de conversie kosten en CNG tankstation netwerk op te lossen (verwacht met de financiering, gunstige regelingen / incentives, etc.). Ondertussen, NIPCO voert bewustmakingscampagne om automobilisten, over de voordelen en de Return on Investment van het ombouwen van voertuigen te informeren.

**Egypte**

Het land, dat bijna 200.000 NGVs en 172 CNGtankstations door eind vorig jaar had, wil 300.000 NGVs en 390 CNG tankstations te hebben door het hele land. CNG voor transport wordt uitgebreid naar een groter gebied, en met meer soorten voertuigen dan alleen auto’s / taxi’s, bussen en vrachtwagens fleets te worden betrokken. Bredere scala van klanten is ook verwacht om te treden tot de “schone” NGV programma naast de “traditionele” klanten (gassen OV-bedrijven).

**Tanzania**

De natie doel is om 8.000 overheid voertuigen om te zetten in biftuel benzine / CNG systeem met biomethaan industrie wordt onderzocht om het vervoer en de overige sectoren te dienen.

USD 55.1 miljard financiering werd genoemd om te worden gebruikt om aardgas infrastructuur voor CNG-tankstations, de binnenlandse (huizen), en de industrie te verbeteren. Vijftien tankstations werden oorspronkelijk gepland om te bouwen in 2012-2015, een 65 km gasleidingen. De Tanzania Petroleum Development Corporation met Pan Africa Energy Tanzania Ltd zal het aardgasprogramma activeren, in de eerste instantie om 200 voertuigen, 100 huishoudens, 10 hotels en instellingen, evenals drie CNG-tankstations te voorzien.

**Mozambique**

Vijfhonderd LDV / auto’s, 150 MDHD bussen en 11 andere soorten voertuigen werden geregistreerd met CNG systeem plus 2 tankstations in juli 2012 in Mozambique. Het land telt ook OEM CNG bussen van bus producer Caio Afrika. Bovendien, de openbare vervoeroperator van Maputo City-TBM-kochten vijf OEM CNG bussen uit China in 2010, maar op dat moment, die waren nog niet ontworpen om te gaan met het klimaat en de staat van de weg van Mozambique. Oorspronkelijk plan van TBM was om 100 aardgas bussen te importeren. Lokaal bedrijf, Auto-Gas, investeerde ongeveer USD 4 miljoen voor voertuigen conversies en gas netwerk. De gehele doelgroep van het land is om 150 aardgasbussen en 2.000 openbare minibussen in Maputo en Malota Steden en het vervoer vloot van de regering te zetten naar bifuel technologie.

**Tunesië**

Hoewel op dit moment niet zo actief, werd Tunesië gemeld te richten naar 100 OEM CNG bussen te hebben en haar vloot van bifuel auto te verhogen. Laatst rapport over NGV statistieken eind 2007- toont 34 NGVs en 1 CNG-station in dit land.

**Algerije**

Algerije twee fasen NGV target-1ste deel in 2007-2011 en de 2e fase in 2012-2025 werd geschat op minstens DZD 28 miljard investering te betrekken om 175 bussen en 14.000 taxi’s te zetten, inkoop van 500 OEM CNG bussen, verbouwen van 152 CNG-tankstations in de grote steden, vier conversie workshops te openen, parkeren plek en het onderhoud centrum voor het openbaar vervoer te voorzien. In december 2011, slechts 160 NGVs en 3 tankstations zijn in gebruik in Algerije.

In september 2014 zijn de cijfers ging tot 150 auto’s / LDV plus 100 CNG-bussen (Medium-Heavy Duty) en binnenkort zal er een ander station worden geopend in een nieuw gebied –.Rouiba. Toch deze 4e grootste gas exporterende land ter wereld wil zijn NGV programma herleven met Sonatrach, Naftal, en de ETUSA openbare busmaatschappij als paar van de belangrijkste actoren in deze industrie.

Andere Afrikaanse landen zijn ook aan het uitvoeren van studies om CNG te gebruiken in hun vervoermiddelen.
Les objectifs en NGV de l’Afrique et l’état actuel

Afrique du Sud

Malgré des statistiques actuelles relativement modestes dans le secteur du NGV, l’Afrique du Sud est la contrée la plus active dans l’implantation d’un programme NGV. La nation est vue par beaucoup, incluant les fournisseurs de véhicules au gaz naturel et de stations de fourniture et les fabricants de NGVs (OEM), comme la contrée la plus prometteuse d’opérer un projet d’adoption du NGV et d’établir un business productif dans ce domaine, dans toute la région.

A la fin du premier trimestre 2014, l’Afrique du Sud avait quasi 300 NGVs répartis en 121 voitures/camionnettes (y compris les voitures de société, les taxis et les minibus), 136 bus (medium duty et heavy duty), et un véhicule d’un autre type. A cette époque, 3 stations CNG au moins, étaient opérationnels et beaucoup d’autres en construction. En septembre 2014, 800 minibus étaient recensés fonctionnant au deux carburants essence/gaz naturel, portant la population de NGVs à quasi 1000 unités.

L’objectif d’étendre le réseau de fourniture de GNG (gaz naturel comprimé) est en route avec les stations mère/fille ainsi que les systèmes de station de remplissage virtuel. Les partenaires en Ngv de l’Afrique du Sud sont heureux de voir plus de voitures et taxis, de flottes de bus publics, de bennes à ordures ménagères changer pour un carburant propre et bon marché. Il est attendu que les vieux taxis soient remplacés par des taxis bi-carburants alors que le secteur du tourisme est encouragé à utiliser le système CNG. Le support du gouvernement et des municipalités est disponible. Le potentiel du bio-méthane pour le transport est à l’étude.

Les holdings CNG de compagnies privées participent également à la conversion au gaz naturel des 1000 taxis. Il est attendu que les véhicules bi-carburants soient utilisés pour le transport à l’étude. Les stations CNG de compagnies privées participent également à la conversion au gaz naturel des 1000 taxis. Il est attendu que les véhicules bi-carburants soient utilisés pour le transport à l’étude.

Nigeria

La Nigerian Gas Company (NGC) et la NIPCO Pic ont décidé d’investir N 17 billion dans l’expansion du réseau de stations de fourniture de CNG, suite à l’adoption par un initiateur et des leaders importants, des NGVs. Cet investissement sera utilisé à la construction de 35 stations de fourniture de CNG partout au Nigeria, avant la fin de 2015. A ce jour, NIPCO a construit 7 stations CNG à l’aide d’une joint-venture dénommée Green Gas. Entre-temps, 10 autres stations sont utilisés pour compléter la phase 1 de la stratégie roll-out du groupe CNG Holding, et un supplément de R-100 million serait accordé afin de promouvoir le CNG comme une énergie alternative abordable pour les industriels et les propriétaires de flottes. Comme une étude de faisabilité du Group le précise, les consommateurs industriels feraient une économie de 10 à 25% sur les coûts énergétiques et les carburants d’exploitation et de 25 à 35% sur les carburants des véhicules de l’exploitation en utilisant le gaz naturel.
l’adoption de ce projet. Le transport public a été mentionné comme un objectif de conversion par le DDF système. Les partenaires locaux du NGV ont attiré l’achat possible de 1000 bus au CNG pour les navetteurs publics. NIPCO, seul, projetait initialement d’installer du CNG dans ses 5000 stations essence/diesel existantes – ou construire des stations purement CNG – et ouvrir des ateliers de conversion. Le “Federal Ministry of Petroleum Resources” est en train d’ouvrir de nouvelles stations franchisées CNG dans les 36 états de la fédération avec 50 km environ de tuyaux de gaz planifiés à être posés en support de ce programme. Le Président Directeur Général de NIPCO, Venkataraman Venkatapathy, déclarait que le CNG devenait l’alternative préférée aux carburants d’origine pétrolière étant donné qu’il est incolore, sans odeur, non toxique, qu’il a une image de prix le moins cher, qu’il a des coûts de maintenance peu élevés, et est moins polluant. Il soulignait que le CNG n’était pas un carburant liquide et qu’il n’était pas du LPG qui en général est un mélange liquide de butane-propane. Il est largement connu dans l’industrie automobile gazière que les réservoirs pour le CNG et ceux pour le LPG ne sont pas les mêmes et ne sont pas interchangeables. Le CNG utilisé dans les voitures doit être stocké sous forme gazeuse à une haute pression 250-200 bar tandis que le LPG sous forme liquide est stocké à une beaucoup plus basse pression 2-15 bar. Les réservoirs de stockage de ces carburants ne sont absolument pas identiques, ils ont différentes caractéristiques et différentes capacités. Un réservoir LPG pour l’automobile est construit pour une pression maximum de 30 bar tandis qu’un réservoir GNG est construit pour une pression de 450-600 bar. Ainsi, encore une fois, dans le secteur du transport, le CNG a une pression opérationnelle beaucoup plus haute que le LPG : 200 bar pour le GNG comparé à 8 bar pour le LPG. Cela signifie qu’un réservoir LPG ne peut absolument pas être utilisé pour stocker du CNG il ne serait pas capable de tenir la pression du CNG (Gaz Naturel Comprimé). Utiliser un réservoir LPG pour y mettre du CNG va provoquer l’explosion du réservoir, le plus souvent lors du remplissage à la station de fourniture de CNG. Venkatapathy déclare que les partenaires CNG de la région sont des compagnies encourageantes à Benin City pour utiliser du CNG dans leurs véhicules et fournir l’énergie pour leurs génératrices. De plus, le Gouvernement Fédéral regarde aussi la possibilité de résoudre les problèmes liés aux coûts des conversions, ainsi que ceux relatifs au réseau de fourniture de gaz pour les stations CNG (au moyen de subsides, de combinaisons favorables, de primes, etc). Entretiens, NIPCO conduit des campagnes de sensibilité à l’attention des conducteurs de véhicules au sujet des bénéfices à réaliser et le retour d’investissement de la conversion du véhicule.

**Égypte**

Ce pays qui avait fin de l’année dernière près de 200.000 NGVs et 172 stations de fourniture envisage les 300.000 NGVs et les 390 stations de CNG à travers le pays. L’adoption du CNG pour le transport est élargie vers une plus vaste région, avec plus de types de véhicules dont les taxis, les voitures, les flottes de bus, les camions. Une plus large catégorie de consommateurs est aussi ciblée pour rejoindre le programme Clean NGV australie des consommateurs traditionnels (compagnies gazières et de transports publics).

**Tanzanie**

L’objectif de la nation est de convertir 8.000 véhicules du gouvernement en bi-carburant essence/CNG. L’industrie du bio-méthane est analysée afin de servir le transport et d’autres secteurs. 55,1 billion de $ de financement ont été mentionnés afin de les utiliser pour augmenter l’infrastructure du gaz naturel à destination des stations de fourniture de CNG, du réseau domestique (habitations) et l’industrie. Quinze stations de CNG étaient initialement prévues, mises en service en 2012-2015 ainsi que 65 km de tuyaux de gaz. La “Tanzania Petroleum Development Corporation” participera avec la “Pan Africa Energy Tanzania Ltd” à activer le programme gaz naturel dont l’objectif initial était de 200 véhicules, 100 raccordements domestiques, dix hôtels et institutions ainsi que trois stations de fourniture de CNG.

**Mozambique**

500 LDVs/voitures, 160 MD-HD bus et 11 véhicules d’autres types ont été enregistrés comme NGV ainsi que deux stations de fourniture, cela en 2012 au Mozambique. La région utilise également des bus CNG (fabrication OEM- Original Equipment Manufacturer) réalisés par Caio Africa. De plus, Maputo City’s public transport-TPM-opérateur acheta cinq OEM-CNG bus en Chine en 2010, mais ces bus n’étaient pas conçus pour supporter le climat du Mozambique et les conditions routières en ce temps là. L’idée initiale de TPM était d’importer 100 bus fonctionnant au gaz naturel. AutoGas, une compagnie locale, a investi près de 4 million de $ pour convertir des véhicules et pour le réseau de gaz. L’objectif total de la région est d’acquérir 150 bus CNG et convertir 2.000 minibus à destination du transport public de Maputo et Maputo Cities et de convertir la flotte du gouvernement.

**Tunisie**

Quoi que peu actif dans le domaine du NGV, il est rapporté que la Tunisie a comme objectif de posséder 100 OEM CNG bus et d’augmenter la flotte de véhicules bicarburant. Le dernier rapport statistique date de 2007 et indique 34 NGVs et une station de fourniture.

**Algérie**

L’objectif NGV de ce pays s’établit en deux étapes. La première se situe de 2007 à 2011 et la deuxième de 2012 à 2025. Cet objectif a été estimé à, au moins, DZD 28 billion pour convertir 100 bus et 14.000 taxis, acheter 500 OEM CNG bus, construire 152 stations de fourniture de CNG dans les villes principales, ouvrir quatre ateliers de conversion, le parking et le service de maintenance pour la flotte de transport urbain. En décembre 2011, 160 NGVs et 3 stations de fourniture étaient en service dans cette région. En septembre 2014, les chiffres grimpent à 150 voitures/LDVs et 100 CNG bus (Medium-Heavy Duty) et bientôt une nouvelle station s’ouvrira dans la région de Rouiba. Cependant, la 4ème région du monde exportatrice de gaz naturel, est embalée de ramener son programme NGV avec la Sonatrach et Naftal comme acteurs principaux mis à part ETUSA, l’opérateur public de bus.

D’autres contrées africaines aussi, réalisent des études afin d’utiliser le CNG dans leur flotte de transport.
For Mercedes-Benz, sustainability and conservation of resources are key to its corporate way of life. For this reason, Mercedes includes Light-Duty (LD) and Heavy-Duty Vehicles (HDVs) that run on “cleaner” and renewable fuels, such as natural gas and purified biogas (so-called biomethane). Across the globe, more than 10,700 Daimler trucks and buses with alternative drive systems are in operation*

In the Light-Duty segment, its Natural Gas Technology (NGT) models are designed under BlueEFFICIENCY technology. It offers low emission and big economic savings. The bifuel petrol/compressed natural gas (CNG) models include B200NGT and E200NGT cars. Additionally it has Sprinter 316 NGT commercial vehicle (wagon) that also operate on bifuel system.

In the Heavy-Duty segment, its famous truck, the Econic NGT, has been successfully adopted around the world since 2002, with over 1,400 units in service in various cities across many nations (Stockholm, Athens, Prague, Valencia, Paris, Berlin, etc).

The Econic NGT

The Econic is used in various applications; as Heavy-Duty commercial trailer, semi-trailer, waste collection truck, road sweeper, goods vehicles (with body box), etc. It is available in two variants: The NGT 1830 and 2630. The truck can be powered not only by Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG), but also by gas from renewable resources-Compressed Biogas (CBG) or Liquefied Biogas (LBG).

To increase its supreme position among the HD Commercial Truck segment, Mercedes improved the gas truck, upgrading it with latest generation of gas engines to comply with Euro VI standards.

In August 2014, the firm launched a new version of its special-purpose waste collection/short-radius distribution vehicle: The Econic NGT Euro VI. The truck with its new M 936 G engine was premiered in Sweden. The new six-cylinder in-line power plant delivers the same performance as a diesel counterpart while at the same time setting a new benchmark in terms of noise and exhaust emissions. Promising an outstanding performance on a par with a diesel engine, the new M 936 G natural-gas engine in the Econic is designed based on the OM 936 turbo diesel engine from the new 7.7 liter BlueEFFICIENCY Power generation. As a mono-fuel engine, it runs solely on CNG and has an output of 222 kW (302 hp). Its maximum torque is equal to 1200 Nm and the truck has an impressive power delivery. The other exceptional point of this vehicle is its ecofriendly character has set new standards in terms of environmental compatibility, with CO2 emissions up to 20 percent below those of a diesel engine. Moreover, when biogas is used to fuel the truck, it will further improve the carbon footprint of the vehicle, minimizing its emission level.

Advantages of Mercedes-Benz Econic NGT*

• Certified in accordance with the EEV emissions standard
• Effective avoidance of fine dust and particulate emissions
50% lower noise emissions

Freedom to operate in low emission zones and areas where operating bans apply

Significantly lower fuel costs

Image-builder thanks to high ecological compatibility

Reduction or elimination of congestion charging costs, Toll Collect, etc.

The Econic NGT is not only able to operate on conventional natural gas in compressed form (CNG – Compressed Natural Gas), but also on renewable biogas as well as liquefied natural gas and biogas. Without any engine modifications whatsoever.

* Versus Truck with diesel engine

Mercedes Econic NGT (natural gas power) can be used as airport catering vehicle, road sweeper, waste disposal vehicle, semitrailer truck, and other logistic mode with box body, etc.

Natural, inexpensive and CO2-neutral fuel

In line with its resources conservation philosophy, all NGT models can be powered with purified biogas (biomethane). Biogas is such a sustainable, inexpensive and environmentally compatible drive system that represents a potential for our future! All fermentable waste materials are suitable for the production of biogas, for example sewage sludge, biological waste products, agricultural fertilizers and plants or parts of plants that have previously been unused. Many of the raw materials are basically available free of charge, and the average methane content of 95 percent generated during fermentation, then refined, makes biogas high in energy and suitable as a CO2-neutral fuel for all vehicle drive systems.

The advantages of biogas: Waste to fuel:

- CO2-neutral
- Use of renewable, local raw materials
- Saving costs and protecting the environment
- Freedom to operate in low emission zones and areas where operating bans apply
- Very low noise: also ideal for nighttime operations
- Fuel costs reduced by up to 50%
- Advantages in vehicle tax, Toll Collect, road tolls, etc.
- High image value

Marketed as a “flexible, versatile, international” vehicle, the Econic model variants with gas drive are geared towards the initiative “Shaping Future Transportation”. At the same time, it ensures the greatest possible traffic safety. With efficient, clean drive systems and alternative fuels, we are on the road towards the emission-free commercial vehicle and sustainable mobility.

Note:

* On 28 June 1926, when Benz & Cie. and Daimler Motoren Gesellschaft formally merged – becoming Daimler-Benz AG – and agreed that thereafter, all of the factories would use the brand name of “Mercedes-Benz” on their automobiles.
The NGV leading country in Africa, Egypt, will expand its CNG filling service network in the country. In a bid to improve natural gas infrastructure and encourage customers to switch to clean alternative fuel, the concerned authorities in Egypt have opened 6 more CNG fueling stations, this year.

The common queues of NGVs at CNG fueling stations in several areas across Egypt are noticed by the related stakeholders.

The vehicles lineups waiting for refueling show the success of NGV project in the country that begun at mid-1990s, when the government set goals to exploit natural gas discoveries.

The newly opened stations would support natural gas fueling grid, which, since few years ago, was extended to the south of Egypt to accelerate development of this area. By end of September 2014, the number of CNG fueling stations reached 181 units, spread across 20 out of 29 governorates in Egypt.

CNG for utility companies in areas far away from the gas grid

The demand on natural gas was highly encouraging, also thanks to requests from several utility companies located in areas without gas pipeline connection.

Major NGV company in Egypt, Gas Tec, has been successfully providing the gas via trailers, from its station to a touristic village in Hurgada City (West Egypt).

Apart from this, iron and steel factory and a food wagon have also been benefiting from Gas Tec’s CNG virtual (mobile) refueling facility. The wider applications of CNG have caught the government’s attention. The government is continuously actively seeking for ways to curb the growing costs of energy subsidies, mainly for liquid fuels that causes an enormous budget deficit. CNG station segment gained ground when the owners start providing gas to public buses, while also offering fueling service to private vehicles.

As per an agreement with Cairo and Alexandria Governorates, gas companies are allowed to established several CNG fueling stations inside the premises of the CNG bus depots, to improve the public transport services and decrease air-pollution level.

More buses are powered on CNG this year, and those mostly operates in Cairo. To facilitate these, more private CNG stations for public buses are planned to be constructed.

Meanwhile, the switch of the widely used public minibuses to CNG still...
poses serious challenges due to the costly conversion costs. As these minibuses run on diesel, the return on investment for the conversion is longer than the petrol vehicles. This is caused by a smaller price gap between CNG (LE 1.10 per cubic meter) and diesel (LE 1.80 per liter) compared to the price gap with petrol (LE 6.25 per liter for petrol octane 95 and LE2.6 a liter for octane 92).

More legislation is still needed

The vehicle conversion activity recently went up a lot since the government increased prices of liquid fuels. Although the price was also increased for the first time since 1990s, CNG is still the cheapest fuel of choice. This has encouraged more customers, especially from the taxi cab sector, to convert their vehicles for economic savings reason.

To further empower vehicles conversion to CNG and reduce diesel vehicles, several legislations are still needed. From January to August/September 2014, about 7,745 NGVs were added, bringing NGV population in the country to more than 207,000 units. In keeping with the increasing trend by global car makers to launch OEM NGVs, some vehicle makers in Egypt collaborate with NGV companies to convert vehicles to CNG at the production line. The QVM NGVs (CNG variant) are now sold at the local market.

Manufacturing NGV components and transferring the related know-how was one of some important steps that NGV companies in Egypt have taken years ago. However, serious efforts to manufacture CNG cylinders and conversion kits in cooperation with reputable global companies has stumbled for many reasons. However, this will likely to pay off in the future considering the promising potentials of the wide Egyptian market, the availability of related experts and skilled human resources, and the availability of government incentives.

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CNG taxis converted in the production line running at Cairo streets
Although Africa is yet to adopt LNG to fuel its transport sector, region’s market development for this liquefied fuel in the region is moving very rapidly. Good news often emerged, lately, with several huge gas resources discoveries revealed all over the continent.

Mozambique

This country is gearing up towards becoming East Africa’s first LNG exporter, while around 25 countries are looking to start new LNG projects within the next five years.

The proposed LNG project in this country is considered to have the lowest upstream capital costs in the world. Thus, many see that Mozambique is a highly attractive location for development.

East Africa has developed as an important hydrocarbon area thanks to the enormous natural gas discoveries made in Mozambique and Tanzania since 2010, according to the Royal Bank of Canada (RBC) Capital Markets. Natural gas and its abundant resources (in this subregion) have waked up the interest of Asian LNG buyers who are seeking to diversify their energy baskets. The low investment cost in Mozambique shows a total initial capital for an offshore greenfield project in Mozambique of between USD 1,600 – 2,100 per ton per annum, compared to USD 2,100 – 2,200 on the U.S. Gulf Coast and USD 2,100 – 2,600 on the Canadian West Coast.

Further convincing news are recorded as gas discoveries offshore Mozambique have made up the largest and most regular source of exploration success over the last few years and recoverable resources. This also helps increasing (potential) investors’ confidence.

Major players such as Exxon Mobil Corp, Chevron Corp, BG Group and Asian national oil companies are looking at various locations across the globe such as Mozambique, Australia, the United States and Canada to build LNG export plants. Various major Oil & Gas (O&G) companies from around the world are eager to - and some already invest in Mozambique gas industry; those include US-based Anadarko Petroleum Corporation, India’s Oil & Natural Gas Corporation and Oil India, Eni, China National Petroleum Corporation, etc.

A recent law, not yet approved, will provide a robust legal framework regarding oil & gas investment including LNG.

The RBC has said that, “In cooperation with the Mozambique government, Eni and Anadarko plan to develop the USD 50 billion onshore Mozambique North LNG project.” Both parties are in talks with potential LNG buyers in the Asia-Pacific region, while coordinating upstream gas development in their respective offshore blocks and joining hands with the Mozambique government to accelerate project approvals.

For this project, the firms aim at establishing 10 trains (LNG production plants) with a total capacity of 50 million tons per annum by 2030.

Tanzania

Meanwhile, Tanzania is also catching up. Recent gas resources discoveries have put the nation in the global energy map, making it one of the hottest supplying markets for the global energy industry. Its natural gas discovery is projected to reach 200 trillion cubic feet by 2016. Various leading O&G firms are also entering this market with 16 international companies already obtaining exploration licenses for oil and gas including British Gas group, Norway-based Statoil, Royal Dutch Shell, and US-based Exxon Corporation.

The market situation is very encouraging that Tanzania is expected to become a leading exporter of LNG by 2025. Commercial production of LNG is expected to commence by 2020. Countries such as China, Chile, Pakistan and Spain were mentioned as (immediate) potential customers.
TPDC encourages the switch to natural gas in Tanzania

The Principal Engineer from Tanzania Petroleum Development Corporation (TPDC), Modestus Lumanto, recently underlined the importance of natural gas fuel in driving the nation’s economy. Lumanto said that the gas will be useful for transport sector, as well as for domestic and industrial users. Using it in those three sectors can potentially reduce the country’s oil import by 60 percent; a whopping number.

Should this be implemented, residents of Tanzania will largely benefit from it. Besides, it could transform the country’s economy as cost of investment will be cheaper (due to lower fuel price), and, thus, lower the price of goods and services.

Lumanto informed since Tanzania has its own gas reserves, the fuel is a much cheaper option than (imported) oil. Besides, with proven gas reserves of 53.45 trillion cubic feet, the fuel can serve the country for around 500 years, if it is not exported, he added. Recent estimation shows that a total of about 200 trillion cubic feet of natural gas reserves (including that has already found) might be discovered within the next two years.

He encouraged motorists to switch from traditional petroleum fuels to natural gas. To do this, motorists only have to make a small modification in their vehicles - by adding CNG conversion kits and CNG cylinder(s) - to enable them to use natural gas. TPDC has a pilot project to demonstrate the use of the fuel, and has installed gas in 17 houses, 36 factories, and 30 vehicles. By last year, the total number of Natural Gas Vehicles (NGVs) in the country was 55 units. There is also a CNG filling station built to serve the refueling needs of those NGVs.
How Europe solves the vicious circle of “chicken and eggs” challenge

EU member states now obliged to ensure minimum coverage of clean fuels refueling facilities for vehicles for EU-wide mobility

Chicken and eggs. One might consider this an outdated term and issue. However, for a country that wants to START adopting alternative fuels in its transport sector, this remains an applicable problem. On some occasions, it remains a challenge for established NGV countries. Up to now, clean fuels have been held back by three main barriers: the high cost of vehicles, a low level of consumer acceptance, and the lack of recharging and filling stations. This is a vicious circle. However, the European Commission (EC) comes with an answer: fuelling, fuelling, and fuelling.

Europe, with over 1.7 million Natural Gas Vehicles (NGVs) and 4,700 methane filling stations (CNG, LNG, and LCNG stations), still sees this as an issue, especially the European Union (EU).

The figure above consists of number of NGVs in the EU member countries and the rest of Europe including Russia. A significant number of that is taken from non-EU countries, such as Armenia (227,000 NGVs), Ukraine (170,000), Russia (90,000), Georgia (81,000), etc.

In the EU itself, of the 25 member countries, there were almost 1.1 million NGVs and almost 1,100 methane filling facilities by July 2013. Recent statistics collected in October 2014 from 26 countries, although many countries are yet to submit their update numbers, showed that NGV population in the member countries touched 1.14 million, while number of methane filling stations spiked up to almost 3,400.

EU population in the NGVs countries is around 506 million, while the total number of vehicles is 276 million. It means NGVs share in the total vehicle fleet in those 26 countries is only 0.4 percent. There are only 2 NGVs per 1,000 inhabitants of those countries. A lower share, thus. The govern entity in the EU is eager to increase these numbers. Therefore, recently it released a new ruling to encourage more alternative fuels adoption in transport sector.

New EU rules have been adopted today to ensure the build-up of alternative refueling points across Europe with common standards for their design and use, including a common plug for recharging electric vehicles. Member States must set and make public their targets and present their national policy frameworks by end-2016.

Commission Vice-President Siim Kallas, commissioner for transport said, “With these new rules, the EU provides long-awaited legal certainty for companies to start investing, and the possibility for economies of scale.”

The directive sets a regulatory framework for the following fuels, amongst others as follows:

- Liquefied Natural Gas (LNG): Natural gas/bio-methane vehicles offer today a well-developed technology, with performances and cost equivalent to petrol or diesel units and with clean exhaust emissions. Natural gas use in trucks and ships can substitute diesel. For the development of LNG for road...
transport, Member States have to ensure a sufficient number of publicly accessible refueling points, with common standards, on the TEN-T core network (see IP/13/948), ideally every 400 km, to be built by end-2025. The directive also requires a minimum coverage to ensure accessibility of LNG in main maritime and inland ports.

- Compressed Natural Gas (CNG): The directive requires Member States to ensure a sufficient number of publicly accessible refueling points, with common standards, to allow the circulation of CNG vehicles, both in urban and suburban areas as well as on the TEN-T core network, ideally every 150 km, to be built by end-2025.

- Hydrogen: The directive aims at ensuring a sufficient number of publicly accessible refueling points, with common standards, in the Member States which opt for hydrogen infrastructure, to be built by end-2025.

- There is also a separate policy regarding recharging points for Electric Vehicles.

In addition, the directive requires that clear information is given to consumers about the fuels that can be used by a vehicle, using standardized labelling in vehicle manuals, at dealerships and on the recharging and filling points. It also aims at providing clear information to users to compare alternative fuel prices with conventional fuel prices. Moreover, Member States must ensure that information about the geographical location of publicly accessible recharging and refueling points is made available in an open and non-discriminatory manner.

Prior to these, several supporting mandates and guidelines were already issued.

In 2013, the European Commission released the Clean Power for transport (CPT) package, which include a policy paper on alternative fuels strategy and the proposal for a Directive on the deployment of alternative fuels infrastructure. Among the policies and proposals, it is also mentioned the distance between natural gas filling stations: a maximum 150 km distance between CNG stations, 400 km for LNG filling facilities, and to install LNG filling stations in all of its maritime and inland ports.

According to the Member of the European Parliament’s (MEP), the EU and other industrialized countries should set a collective target reducing greenhouse gas emissions by 25-40 percent until 2020, and by at least 80 percent by 2050, from 1990 levels. The EU aims at addressing the unsustainable development in emissions from the transport sector in several ways, including by accelerating the use of fuel efficient vehicles for transport via tougher CO2 demand, increasing the use of renewable fuels (including biogas) and energy within the transportation sector, etc. Also, in 2014, EURO 6 emission norms apply. The level of toxic emission reductions (varies from CO, HC, HC+NOx, NOx, PM, PN, THC, MNHC, smoke) is different for each vehicle type. EU Regulation No 443/2009 sets an average CO2 emissions target for new passenger cars of 130 grams per kilometer. The target is gradually being phased in between 2012 and 2015. A target of 95 grams per kilometer will apply from 2021.

For light commercial vehicle, a CO2 emissions target of 175 g/km applies from 2017, and 147 g/km from 2020.

The European Commission has also adopted a strategy to curb CO2 emissions from trucks, buses and coaches. It aims to bring forward proposals for legislation next year which would require CO2 emissions from new HDVs to be certified, reported and monitored. It may consider further measures to curb CO2 emissions from HDVs. The most apparent option is to set mandatory limits on average CO2 emissions from newly-registered HDVs.

EC’s study result suggests that state-of-the-art technologies can achieve cost-effective reductions of at least 30 percent in CO2 emissions from new HDVs.

Meanwhile, the EC is working on the establishment of a competitive transport system while reducing Europe’s dependence on imported oil. The strategy encompasses several key goals for 2050:

- No more conventionally fuelled cars in cities.
- 40 percent use of sustainable low carbon fuels in aviation; at least 40 percent cut in shipping emissions.
- A 50 percent shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport.
- All of which will contribute to a 60 percent cut in (carbon) transport emissions by the middle of the century.

Further details of this Transport 2050 roadmap set different goals for different types of journey - within cities, between cities, and long distance. It also describes the goals to move towards “low-carbon fuels” in aviation (40 percent by 2050; reduce EU CO2 emissions from maritime bunker fuels by 40 percent by the same year).

For urban transport, there must be a big shift to cleaner cars and cleaner fuels. It aims to half conventionally fuelled cars by 2030, phasing them out in cities by 2050, while achieving essentially CO2-free movement of goods in major urban centers by 2030.
In September this year, Westport Innovations, Canadian-based company that develops alternative fuel, low-emissions technologies to allow engines to operate on clean-burning fuels, unveiled a series of engine advances for natural gas vehicles (NGV).

The system developer introduced its newest proprietary technology, a first generation of an enhanced spark-ignited (ESI) natural gas engine aimed at the medium-duty truck market this autumn season. Developed to meet the highest level of OEM quality standards, Westport’s new combustion system and components have been undergoing testing and offer ready integration into OEM applications globally. Its durability and reliability levels are expected to meet an OEM’s extensive engine development program. The Westport™ ESI combustion system is targeted at sub 9L engines for Class 6 and 7 truck applications and is also adaptable for sub 2L applications for use in automotive and non-automotive applications.

Westport said that the new design is cost competitive while providing similar levels of power, torque, and fuel economy to a larger diesel engine. Using solely natural gas as fuel, its new technology is said to optimize the combustion and thermal efficiencies of the engine by taking advantage of the positive properties of natural gas.

“As petrol and diesel engines progress, it is critical that OEMs offer natural gas engines that retain their expected performance while providing the environmental and economic benefits of natural gas,” said Jack Keaton, Westport EVP of Global Spark Ignited Direct Injection.

“Westport is taking its technology leadership to the next level by introducing a long term technology solution that allows improvements in engine performance and fuel economy, thus offering highly attractive operating costs and a low emissions profile. As the ESI technology continues to be developed, Westport will incorporate competitive performance upgrades to support the longevity of this system.”
**Company and product**

**Key features of Westport ESI natural gas system**

- **Optimized for spark ignited engines**
  Improvements in combustion and thermal management compared to typical spark-ignited natural gas engines ultimately enhance the engine’s reliability.

- **Designed to provide up to 10 percent improvement in power and torque over the base diesel engine**
  Higher performance from a spark-ignited natural gas engine compared to a diesel engine potentially allows a 4L natural gas engine to replace a 6L diesel engine, which results in substantial mass reduction.

- **Comparable fuel economy to diesel engine**
  By taking advantage of the positive properties of natural gas—for example, natural gas has less calorific energy compared to diesel—Westport believes that it is able to improve the fuel economy of a typical spark-ignited natural gas engine. In addition, cooled exhaust gas recirculation (EGR) is applied, which is a well-known mechanism for improving fuel efficiency, used extensively in passenger vehicles.

- **Designed to provide up to 40 percent brake thermal efficiency**
  Brake thermal efficiency measures how much fuel is converted to useful energy. Typical spark-ignited natural gas engines have approximately 25–30 percent brake thermal efficiency and diesel engines have approximately 41 percent brake thermal efficiency.

- **Designed to provide up to 5 percent weight reduction compared to the base diesel engine**
  Weight is a critical element for truck fleets, so any reduction in engine weight equals an increase in payload.

- **Fuel injection**
  The current system utilizes port injection providing better cylinder to cylinder control of the air fuel ratio. However, it is designed for upgrades to future technologies.

- **Incorporates key Westport engine components**
  This includes Westport WPS80 Engine Management System and Westport fuel system components.

- **Stoichiometric operation and three-way catalyst (TWC) after treatment**
  TWCs are effective, simple devices, packaged as part of the muffler, that provide consistent emissions control performance and are maintenance-free. By using 100 percent natural gas, there is no requirement for diesel particulate filter (DPF) or selective catalytic reduction (SCR) systems. This allows cost and weight reduction over base diesel engine.

- **Expected to meet the most rigorous emissions levels**
  Westport ESI is designed to meet the latest emission regulations including Euro VI and U.S. Environmental Protection Agency 2014 standards.

- **Compressed natural gas (CNG) or liquefied natural gas (LNG) capability**
  Every natural gas engine burns CNG. Ultimately, the customer will decide which form of natural gas they wish to carry—either high pressure CNG or cold cryogenic LNG—based on a number of variables including but not limited to: weight of the load; weight of the fuel storage system; range required by the vehicle; and availability of CNG and LNG.

**WEH® Particle Filters for safe CNG and H₂ refuelling**

Filtering CNG and hydrogen used for refuelling is essential for the proper functioning of components, both for vehicles and fuelling stations. Build up of residues, such as oil or metal shavings can have a negative influence on fittings and valves and even result in damage and leakages. The new WEH® TSF2 and TSF4 particle filters have been specially designed to remove such particles from the gas flow. Having a high particle retention, they filter the gas flow and remove reliably and securely those particles contaminating the gas. With integrated filter elements ranging from 1 to 40 micron, the particle filter protects your refuelling components, such as fuelling nozzles, receptacles, check valves, cylinder valves and gas pressure regulator from the dirt found in the gas stream. All filters are constructed of high-quality materials and either have a filter cartridge that can be cleaned easily and used again or a replaceable filter cartridge. They are easy to maintain and can also be retrofitted to fuelling stations and vehicles.

The WEH® filters ensure well filtered CNG and hydrogen which will enhance service life of refuelling components and reduce maintenance cost. The filters are available in different sizes and versions. The range of products covers coalescing filters for high pressure use up to 390 bar and for retaining particles from 0.3 to 1 micron. The gas flows through the filter and those particles being slower, such as oil, water and other liquid aerosols form drops sinking to the bottom of the filter where they are drained via the oil outlet. These filters feature ease of maintenance and have an integrated fine filter for particle retention.

All WEH® CNG and Hydrogen Filters have been designed especially for installation in cars, buses, trucks and fuelling stations and are highly efficient (efficiency rate of 99% for 0.3 micron particles). They have CE marking and are in compliance with the Pressure Equipment Directive PED97/23/EC and have the ECE R110 approval for installation in CNG fuelled vehicles.

**WEH® CNG Particle Filters**

For further questions or pictures please contact: Birgit Burkhardt, WEH Public Relations eMail: presseninfo@weh.com / Phone: +49 (0) 7303 95190-21
WEH GmbH Josef-Henle-Str. 1 89257 Illertissen Germany www.weh.com
Phone: +49 7303 951900 / Fax: +49 7303 951909999
As the Econic NGT (Natural Gas Technology), the Mercedes-Benz Econic specialising in waste collection and distribution is now equipped with the new M 936 G natural gas engine. This six-cylinder inline unit delivers the same performance as a diesel engine while setting standards with respect to noise and exhaust emissions.

**M 936 G gas engine: clean, efficient and quiet drive system**

The M 936 G natural gas engine is based on the 7.7-litre OM 936 turbodiesel engine. As a mono-fuel engine, it runs on compressed natural gas (CNG) and has an output of 222 kW (302 hp) while delivering maximum torque of 1200 Nm. Figures like these, in combination with its impressive power delivery, place the single-stage turbocharged engine on a par with its diesel-powered counterpart. At the same time it sets new standards in terms of environmental compatibility, with CO₂ emissions up to 20 percent below those of a diesel engine. Using biogas further improves the carbon footprint.

Specially matched to the needs of CNG operation

The cylinder block and cylinder head are the same as for the diesel engine, having merely been adapted for operation with CNG. Newly developed items are the turbocharger, charge-air ducting, ignition and mixture formation, including exhaust-gas recirculation. The ignition system in a natural gas engine is identical to that in a petrol engine. The M 936 G uses spark plugs with pencil-type ignition coils. They are housed in the same space that originally accommodated the fuel injectors in the diesel engine. The piston crown now has a different geometry. The new natural gas engine operates with a stoichiometric combustion of \( \text{Lambda} = 1 \), like a modern petrol engine. This results in especially clean combustion allied to high power output and low pollutant emissions.

A turbocharger with asymmetrical turbine geometry ensures an excellent response from the engine while at the same time supplying the cooled exhaust gas recirculation. The usual particulate filter is omitted thanks to the practically soot-free combustion. As in a spark-ignition engine, emission control is by means of a three-way catalytic converter.

Over the entire engine speed range, the natural gas engine has an even lower noise level than the already quiet OM 936 diesel engine. Further advantages of the new gas drive system: The additional weight compared to diesel drive has been halved to only around 500 kg. This is due to new gas cylinders in carbon-fibre-encased rugged steel specially produced for a lightweight construction.
OM 936 diesel engine: reduced emissions and particle numbers

The OM 936 diesel engine in the Econic boasts low emissions. The range features two six-cylinder engines from the OM 936 series with a basic output of 220 kW (299 hp) and top output of 260 kW (354 hp) respectively, and a displacement of 7.7 l. For this reason, the powertrain in the Econic continues to include the Allison six-speed automatic transmission – there’s hardly a more agreeable way to navigate in dense urban traffic. For the new generation of Econic vehicles, the transmission has been provided with new eco software, which saves fuel while at the same time increasing ride comfort.

Cab: modern design, ergonomic and perfect for the job

At the heart of the concept behind the Econic – a total of over 13,000 units have been produced since the model series was launched in 1998 – is the ergonomically low-entry and highly spacious cab with its single-step entrance. The Econic has long since been synonymous with collection and distribution operations. The new interior layout is immediately obvious when entering the cab. The completely revised cockpit with a new multifunction steering wheel and individually placed switches offers the driver ideal working conditions. The relocation of the parking brake and transmission controls to the same height as the steering wheel makes them easier to use, safer and more ergonomic. There is added stowage space thanks to lockable stowage compartments above the front passenger seats as well as cup holders in the centre console compartment. Behind the co-drivers’ seats there is also space for up to three beverage bottles. More extensive insulation of the cab and engine tunnel ensures an even better working environment.

Success story in many variants

The Econic comes in the configurations 4x2, 6x4, 6x2/4, 8x4 and 8x4/2 with electrohydraulic and progressively steered trailing and leading axle in permissible gross weight ratings of 18 and 26 t. Customised variants, such as a four-axle triple variant (three axles at the rear) with a total weight of 32 t and the new 9 t trailing axle, are also available. Uniform hole patterns in combination with a movable cross member and rearranged components behind the cab result in improved body-mounting ability while providing extra implement-mounting space. The load capacity of the front axle has also been increased to 8 t.

By: Mercedes-Benz
www.daimler.com
Company and product

Buschjost valves for CNG filling stations: High reliability

For over 80 years, Buschjost produces solenoid valves and systems for numerous applications. Since early 2008, the Bad Oeynhausen company is now also active in the high-pressure valve technology. If CNG is offered in gas stations, this constitutes the highest demands on function, leaks and the security of the solenoid valves. The valves are exposed to high loads, as the storage density requires an increased pressure of the gas supplied from the conventional low-pressure pipeline network. The natural gas is compressed in the gas plant to a pressure of 250 bar to 300 and stored in high pressure bottle bundles, before it is filled into the natural gas-powered vehicles.

The solenoid valves need to meet highest requirements. Depending on the customer frequency at the gas station, the high-pressure solenoid valves must be able to withstand a high number of switching operations. The pressure differences typically amount to 200 bar. These pressures mean highest demands to the solenoid valves. The quality of workmanship and material selection are crucial. Therefore only high quality materials and very durable sealing materials are used. The solenoid valves are tested dynamically at a pressure of 350 and statically at a pressure of 525 bar, before they leave the Buschjost factory. The burst pressure of these valves is at least about 1200th.

The individual components are precisely matched to each other, thus ensuring a very high durability of the valves. In addition, the valves are easy to install and service friendly. Based on the technical design and the high-performance sealing materials used in the solenoid valves they achieve a very high tightness. This of course requires the natural gas to be free of any particles. Buschjost suggests to place appropriate filters, which usually are part of a natural gas fuelling facilities anyway. And of course the high pressure valves meet the regulations of the Pressure Equipment Directive and are certified according to ATEX or NEMA / FM.

Due to their compact design, the valves can also easily be integrated into any thing from simple 3-fold to complex 11-fold solenoid valve manifolds with integrated filters and check valves. Buschjost already has developed several customized solutions for different customers. With small modifications the high pressure valves can be also re-designed to be used for hydrogen. And to meet the specific market requirements in this market Buschjost will continuously develop new high quality system solutions such as pressure regulators or excess flow, safety or venting valves, etc.

Contact:
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HRB 11565 Bad Oeynhausen
Web: www.buschjost.de
The statement was made by Pilona Miranda Chongo, Deputy National Director of Fuels of Mozambique’s Ministry of Energy in an interview with NGVJournal.com. The officer led the delegation that visited Buenos Aires, Argentina including a meeting at the Argentine Chamber of CNG, a tour to companies of different segments and a gathering at the headquarters of NGV Communications Group, the organizers of the first African NGV event-NGV2014 South Africa Conference and Exhibition, November 17-20 in Johannesburg.

“We have the obligation to make the widespread use of CNG in our country a reality and change our energy grid. We must stop importing fuels and take advantage of the enormous natural gas resources Mozambique has for this one and other applications,” Chongo said, as part of the program guideline her country is implementing and the reason why she came to Argentina, e.g. to learn more about the local experience in CNG use and also the manufacture and export of NGV equipment.

It is worth mentioning that the official delegation was received by the Argentine Chamber of CNG last Monday and had the opportunity to exchange ideas regarding trade and legislation issues. On Tuesday, the specialists from Mozambique were able to tour premises of manufacturers of compressors, turnkey refueling stations, mobile gas pipeline systems, kits producers and a dispensing station in operation. The tour included visits to Galileo, TA, Agira and a Gas Natural Fenosa filling station.

On August 29th, 2014, Pilona Chongo—along with Natalia Teodoro Simango, Chief of Department of Licensing and Technical Support of the Mozambique’s Ministry for Energy—had a meeting at NGV Communications Group’s offices in Buenos Aires. Finally, Pilona Chongo said the exchange with Argentina have been underway for some time since there are CNG stations and conversion centers operating in Mozambique which feature imported equipment. The official also informed that a five-year program is being carried out and will involve technical experts from Argentina that will travel to the African country in order to train local staff to help push the NGV comprehensive project, which is already a burgeoning state policy.
Johannesburg Mayor commits to NGV use to improve city air

During the Gas Mobility Summit at the University of Johannesburg, Mpho Parks Tau has challenged industry players in general and vehicle manufacturers in particular to come up with concrete and sustainable plans to reduce greenhouse gas emissions in the city, saying “the time for talking was over”. “The city subscribes to the notion of the reduction of emissions. It is imperative that we find alternative energy sources that will also meet our objectives of enterprise development and job creation,” he said.

According to Mayor Tau, Johannesburg is working towards enabling and supporting all aspects of the gas for mobility value chain. The city is currently reliant on CNG from Egoli Gas. However, they are also working on developing projects that transform waste to energy using non-traditional resource streams such as municipal solid waste, green waste and waste water. The city has already completed a pre-feasibility study on the potential of the Joburg Market waste stream, and it was found there is potentially sufficient biomethane to supply approximately 700,000 liters of diesel equivalent fuel every year. The mayor said biogas would be upgraded through a process of cleaning and compression before it is either used at a site of production or injected into the existing CNG pipeline to be used wherever it is required.

Tau also said the taxi industry, through partnerships with the Gauteng Provincial Government, the Automotive Industrial Development Centre and SANEDI, has already converted 800 minibus taxis from fossil fuels to natural gas. Minibuses provide approximately 70% of the public transportation needs and there are currently about 18,000 units in operation.

Source: City of Johannesburg

Nigeria: Nipco and NGC prepare to expand natural gas fueling network

Green Gas, the joint venture between Nipco and Nigerian Gas Company (NGC), plans to develop and install 35 CNG stations across the country before the end of 2015. The project involves an investment of over N17 billion (more than US$100 million). This collaboration has already built seven filling stations, while 10 additional sites have reached advanced stages of construction, reported National Mirror.

The Federal Government through the Nigerian National Petroleum Corporation (NNPC) is encouraging an “NGV revolution,” which has culminated in the conversion of over 1,500 vehicles to CNG at three workshops. NGVs are expected to increase to over 25,000 next year when ongoing projects are completed. Some multinationals, including the Nigerian Bottling Company Plc., are among those that have converted fleet trucks from diesel to gas. According to Nipco’s Managing Director Venkataraman Venkatapathy, “CNG has become increasingly popular and a preferred alternative to gasoline and diesel” because it is colorless, odorless, more economic and reduces operation and maintenance costs. In addition, this new industry boosts additional employment opportunities and cuts carbon emissions leading to improved air quality.

“The cost of conversion and availability of gas are some of the major challenges on this scheme, but concerted efforts are on under the joint venture arrangement to further appeal to the Federal Government to look into these areas,” he said. “On our part, subtle campaigns are ongoing to convince drivers of the inherent benefits in using CNG over other conventional fuels and the fact that the more you travel on it, the faster the recovery period on expenses incurred on installing the kits.”
African energy utility company plans to launch CNG business by early 2015

Victoria Oil and Gas Plc announced that its subsidiary Gaz du Cameroun S.A ("GDC") will commence the 1km gas pipeline crossing under the Wouri River to Bonaberi. GDC has completed initial project planning, including environmental and safety analyses and has received all the necessary permits, including the grant of Certificate of Environmental Conformity by the Minister in Charge of Environment, Nature Protection and Sustainable Development. As part of this initiative, Victoria has entered into discussions with strategic and financial partners with a view to develop an operating CNG business in Douala in early 2015. The Company has long recognized the potential for this fuel as it is used in many countries for industrial and transportation applications, and it can be shipped in tankers to customers beyond the limits of the pipelines.

“Our operations are steady and satisfactory with production costs expected to decrease in the next months. Having completed all necessary permitting for the Wouri crossing we have commenced work to shoot the 1km of pipe, under the river, and then start supplying the Bonaberi area with gas. With firm contracts already in place for supply in Bonaberi we shall immediately begin connections upon entry to the North shore. We are excited about our venture into CNG which can give GDC greater catchment area for customers beyond our pipeline and outside of Douala,” said Kevin Foo, chairman of Victoria Oil and Gas.

Algeria: Naftal will launch its first CNG refueling station in Rouïba

The National Society of Transport and Commercialization of Petroleum Products (Naftal, as in its French acronym) announced last month it will open “very soon” the first filling station offering compressed natural gas at national level. It will be located in Rouiba, a municipality in the eastern suburbs of Algiers. “CNG will be on the market very soon, the first station will be operational very soon in Rouiba. We are in the final stage of the launching,” said Djamel Cherdoud, communications director of Naftal, during the fifth edition of the annual open house at the company’s facility. He also remarked that CNG is a cleaner energy, “more ecological and less expensive compared to other fuels” and that Naftal continues its efforts for the promotion of natural gas for vehicles for its economic and environmental benefits. Other company’s experts explained to visitors how to safely use, transport and change gas cylinders.

Naftal has already experience in the supply of CNG in the transit market as a filling station was built and opened by the company on behalf of ETUSA (Algiers’ operator of urban and suburban public transportation), along with the conversion of a hundred of buses.

Source: Naftal / APS (Algérie Presse Service)
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NGV statistics

Fuel Prices

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<tr>
<th>Country</th>
<th>Premium petrol (liter)</th>
<th>Regular petrol (liter)</th>
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Cities with CNG refuelling stations

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Natural Gas Vehicles

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<th>Refuelling stations</th>
<th>Monthly gas consumption (M Nm3)</th>
<th>Last update</th>
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<tbody>
<tr>
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<td>Total</td>
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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.
## Worldwide NGV statistics

<table>
<thead>
<tr>
<th>Country</th>
<th>Natural Gas Vehicles</th>
<th>Refuelling stations</th>
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