

TECHNOLOGIES
TO SUPPORT ECOLOGY



economotive solutions
Diesel Dual Fuel Technology



CNG ROMANIA LAUNCH EVENT
28th APRIL 2017 – WORLD TRADE CENTER BUCHAREST

ECOMOTIVE SOLUTIONS

Presents

Diesel Dual Fuel Vehicles

Opportunity For a Fast Growth of Natural Gas Market

ECOMOTIVE SOLUTIONS

an Holdim Group Company

HOLDiM

Group
Since 1991



Group
Headquarter



Branch Companies



Group Headquarter - Serralunga di Crea (AL) - ITALY

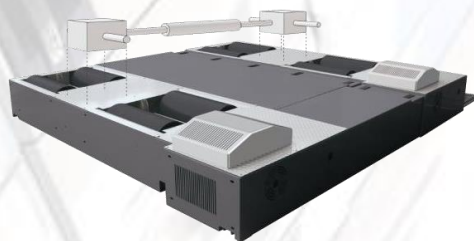
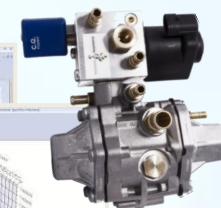
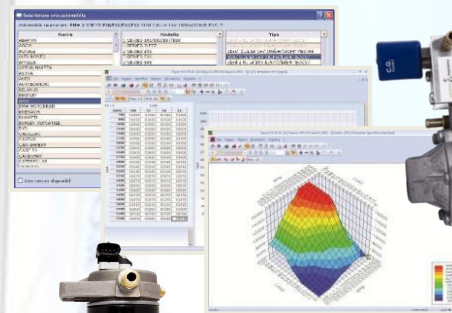
ecomotive solutions



Ecomotive Solutions proposes the ideal Diesel Dual Fuel technology for vehicle's owners as well as professional transporters, permitting improvements in the fuel economy while helping the environment.

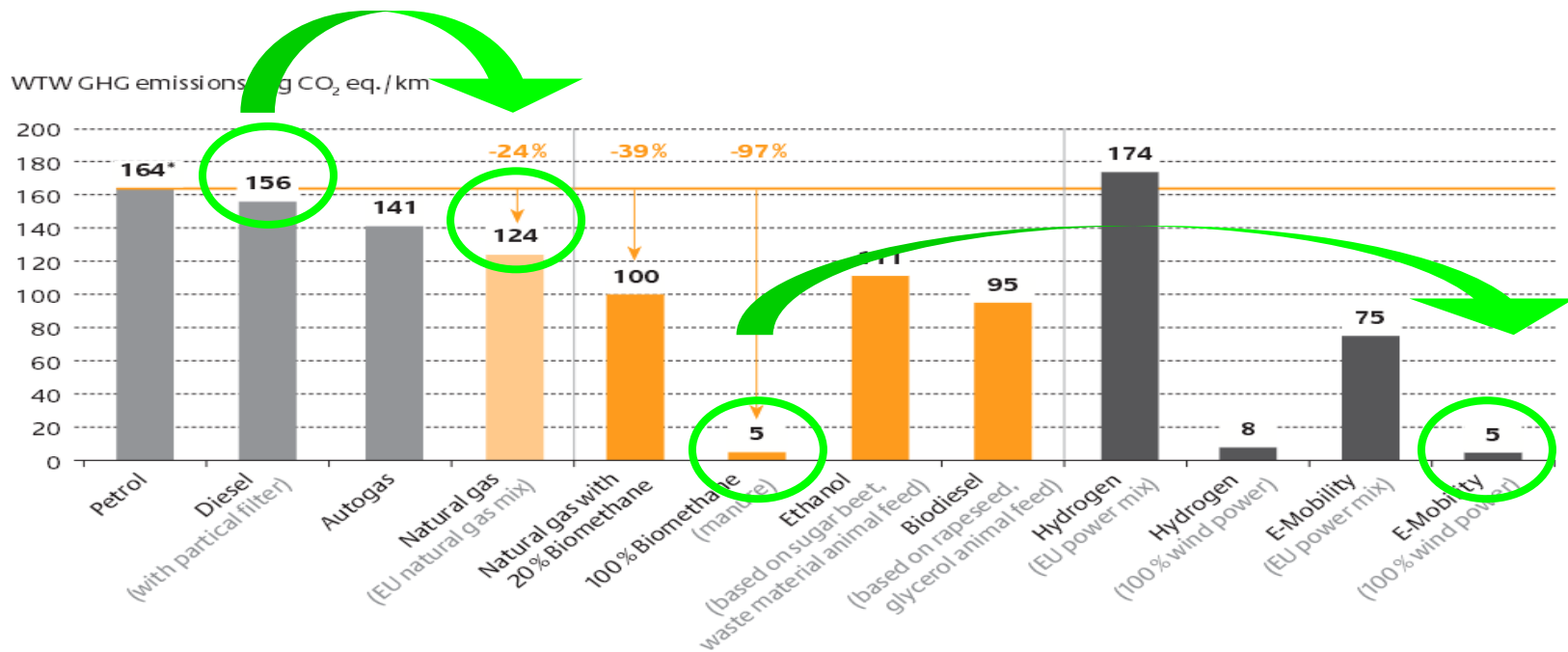
A range of solutions aimed at supporting light commercial & heavy duty vehicles, marine applications and energy production has been released in the years.

*Thanks to the expertise and skills acquired at the **Holdim Group**, which - since 1991 - is involved in the electronic management of the engine working, the company is able to offer innovative 'made in Italy' products, qualified training and technical support throughout the world.*

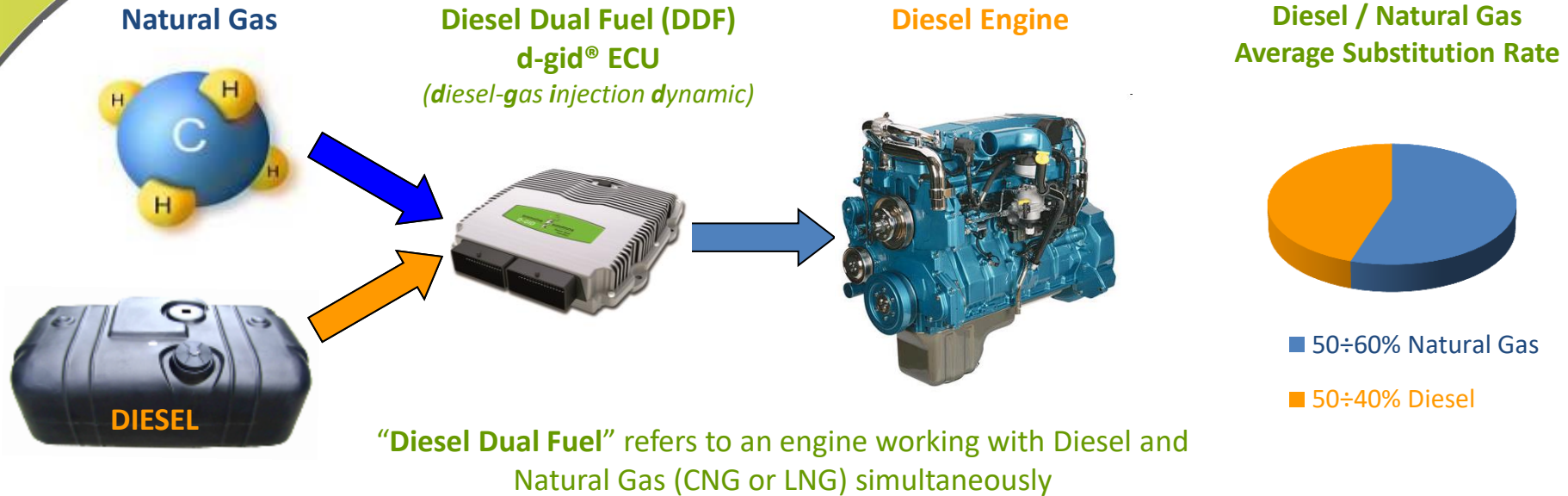


d-gid[®]
(Diesel & Gas Dynamic Injection)
Ecomotive Solutions
Diesel Dual Fuel Technology for Natural Gas

Natural Gas the Cleanest Alternative Fuel

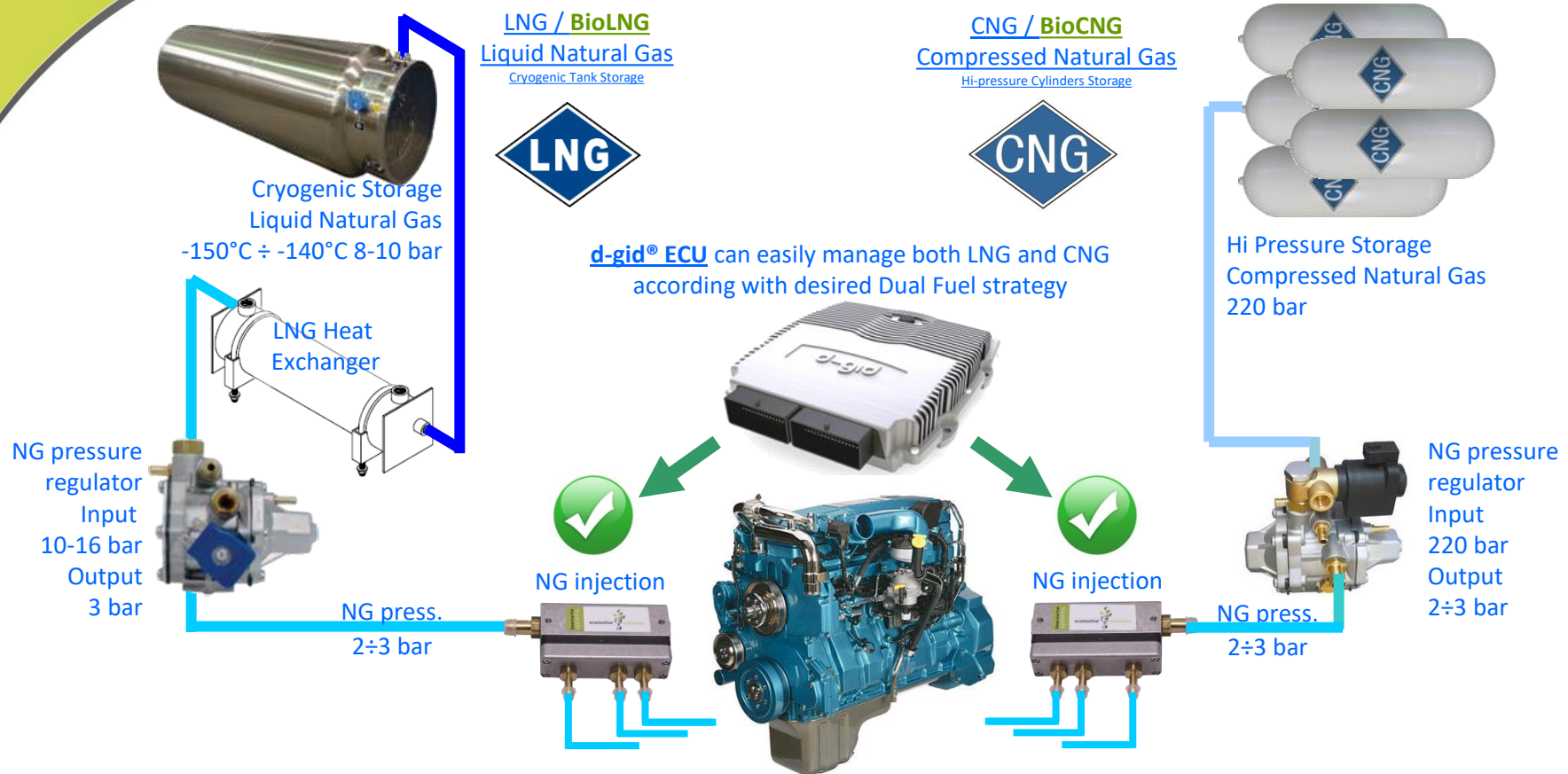


d-gid[®] Diesel Dual Fuel Basic Knowledge




d-gid system allowing to fuel diesel engines with a mixture of diesel oil and natural gas (CNG compressed natural gas, LNG liquefied natural gas, Biomethane, Syngas, etc.), d-gid Control Unit determines the amount of diesel fuel injected and air/gas mixture dosage dynamically, modifying it in real time according to the feedback provided by the engine to guarantee perfect operational conditions.

d-gid® Flexible CNG & LNG Dual Fuel System

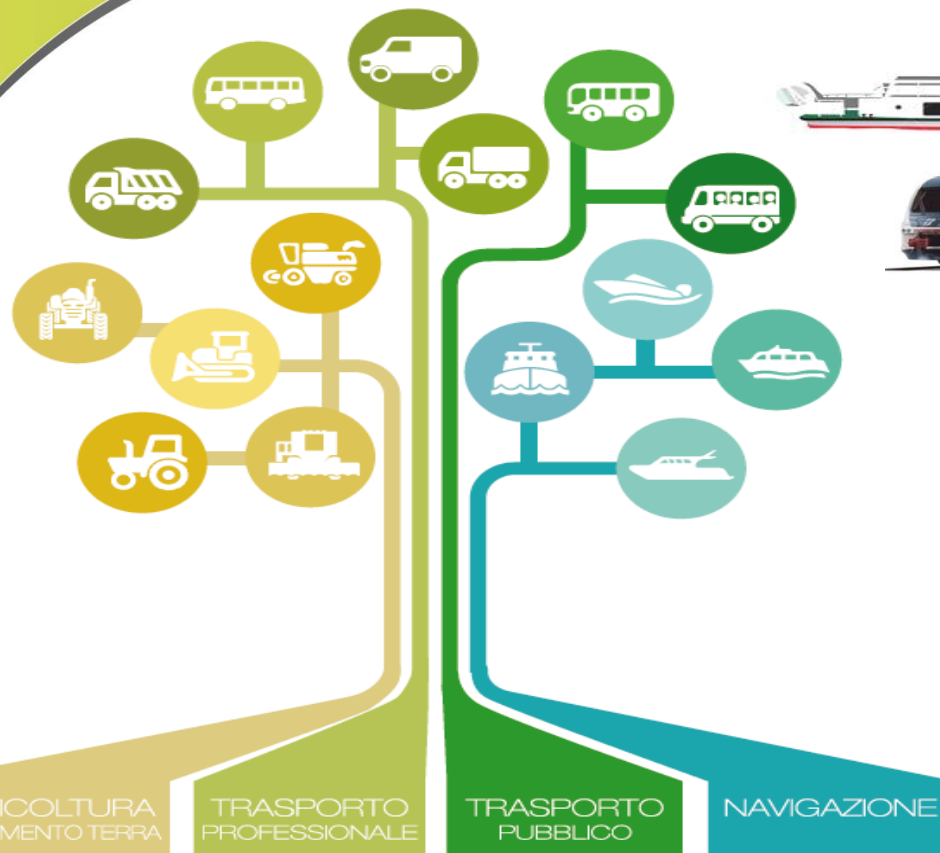


Diesel Dual Fuel Advantages

- ✓ Low impact on the architecture of the engine, which remain a standard Diesel cycle engine: 100% fallback Diesel at any time. No irreversible modification achieved.
- ✓ Possibility to switch between Diesel/Gas mixture and 100% Diesel mode simply by pressing an on/off selector.
- ✓ Automatic set to 100% diesel when the natural gas tank is empty or in case of trouble detection.
- ✓ The engine does not decrease performance and efficiency in DDF mode: torque and power outcomes remain practically unvaried.
- ✓ Particulate reductions.
- ✓ Carbon footprint/emission reduced. 
- ✓ Improved engine oil quality determined by high reductions of carbon emission.
- ✓ Engine noise reduced up to 5db thanks to natural gas smoother combustion.
- ✓ Significant reductions of operating costs thanks to Diesel-Gas substitution.



d-gid® Dual Fuel Technology Application Fields



d-gid[®] Diesel Dual Fuel (DDF)

A Simple Business Study

Business Case Study Diesel Dual Fuel

Veicolo usato per lo sviluppo del business plan:

Heavy Duty Truck N3 category, engine capacity 10÷16 Liters

DIESEL vs. DIESEL + Natural Gas CNG

VEHICLE DATA		
Diesel Consumption (l/100km)	Distance Day (Km/Day)	Distance Year (Km/Year)
31,25	500	120.000

DRIVING CYCLE (*)	SUBSTITUTION RATE
HIGHWAY - INTERSTATE	(*) AVG Substitution Diesel/Natural Gas (%)
	50%

DIESEL 100% CONSUMPTION	
Diesel Day (Liters)	Diesel Year (Liters)
156	37.500

DIESEL 100% COST	
Diesel Day (Lei/Day)	Diesel Year (Lei/Year)
Lei 755	Lei 181.125

DUAL FUEL DIESEL + NATURAL GAS CONSUMPTION			
DDF Diesel (Liters/Day)	DDF Natural Gas (Kg/Day)	DDF Diesel (Liters/Year)	DDF Natural Gas (Kg/Year)
102	78	18.750	14.417

DUAL FUEL DIESEL + NATURAL GAS COST			
Day Cost Dual Fuel Diesel	Day Cost Dual Fuel Natural Gas	Year Cost Dual Fuel Diesel	Year Cost Dual Fuel Natural Gas
Lei 377	Lei 198	Lei 95.563	Lei 47.431

TOTAL COST DIESEL + NATURAL GAS	
Cost Diesel+NGas Day	Cost Diesel+NGas Year
Lei 575	Lei 137.993

SAVING DIESEL DUAL FUEL		
Day Saving Dual Fuel	Year Saving Dual Fuel	AVG Saving (%)
Lei 180	Lei 43.132	23%

d-gid[®] Diesel Dual Fuel (DDF) Homologation

d-gid® Dual Fuel Components NGV Homologation

*All the Natural Gas components used in our kit must be certified according with
UNECE 110R and UNECE 10R*



UNECE 110R

Specific components for vehicles of category M and N using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system;

UNECE 10R

Vehicles of categories L, M, N and O with regard to electromagnetic compatibility.

d-gid® NGV Homologations

The Italian Ministry of Transport (MIT) homologates Diesel Dual Fuel vehicles according with Italian regulation:

U. di G. – MOT3 n. 220/M3/C2 del 14/02/2000

*The results of the homologation with
“U. di G. – MOT3 n. 220/M3/C2 del
14/02/2000” is the **DGM** type approval.*

*ECOMOTIVE SOLUTIONS has got since
2012 the **DGM 59649** who authorized us to
homologate Natural Gas Dual Fuel vehicles,
through any local department of MIT.*


Ministero
delle Infrastrutture e dei Trasporti
 DIPARTIMENTO PER I TRASPORTI, LA NAVIGAZIONE,
 GLI AFFARI GENERALI ED IL PERSONALE
 Direzione Generale per la Motorizzazione
 DIVISIONE 3

Prot. ingresso: 22410-DIV3-P-910
 Prot. uscita: 27622
 Allegati: vari

Roma, 30.11.2015

 Alla **ECOMOTIVE SOLUTIONS S.r.l.**
 Zona Ind.le Loc. San Iorio, 8 C
 15020 Serralunga di Crea (AL)

Oggetto: Ditta **ECOMOTIVE SOLUTIONS S.r.l.**- Serralunga di Crea (AL).

Omologazione complessiva di trasformazione a Metano per veicoli dotati di motori con ciclo diesel. Trasformazione dell'alimentazione originaria da gasolio a gasolio-metano (dual fuel) ai sensi della circolare U. di G. – MOT3 n. 220/M3/C2 del 14.02.2000.

Per il complessivo in oggetto si è dato corso al seguente provvedimento di omologazione:

TIPO	PROVVEDIMENTO	DATA
ECOMOTIVE SOLUTIONS D-GID	DGM 59649 GM Agg.04	23.11.2015

II DIRETTORE DELLA DIVISIONE
 (dr. ing. Vito DI SANTO)



VC

LETTERA+CERTIFICATO-ECOMOTIVE SOLUTIONS D-GID-AGG04

d-gid® Has Got First European NGV EURO 6 Homologations for Light Duty Vehicles

*November 2015, Italian Ministry of Transport released to EOMOTIVE SOLUTIONS the first European type approval for **EURO6 Diesel Dual Fuel Light Duty Vehicles (LCV).***

CNG homologation for LCV - Type approval DGM 59649

*Also available **LPG** homologation for LCV*



d-gid® Has Got First NGV EURO 6 Homologations for Heavy Duty Vehicles

*December 2016, Italian Ministry of Transport released to
EOMOTIVE SOLUTIONS the first European type approval for **EURO6**
Diesel Dual Fuel Heavy Duty Vehicles (HDV).*

***CNG/LNG** homologation for HDV
Type approval extension to DGM 59649*

*Also available **LPG**
homologation for LCV*





*Ministero
delle Infrastrutture e dei Trasporti*

DIPARTIMENTO PER I TRASPORTI, LA NAVIGAZIONE,
GLI AFFARI GENERALI ED IL PERSONALE
Direzione Generale per la Motorizzazione
DIVISIONE 3

Prot. Ingresso 22409-DIV3-P-910 Roma, 30.11.2015
Prot. uscita 27621

Allegati vari

Alla **ECOMOTIVE SOLUTIONS S.r.l.**
Zona Ind.le Loc. San Iorio, 8 C
15020 Serralunga di Crea (AL)

Oggetto: Ditta **ECOMOTIVE SOLUTIONS S.r.l.**- Serralunga di Crea (AL).

Omologazione complessiva di trasformazione a Metano per veicoli dotati di motori con ciclo diesel. Trasformazione dell'alimentazione originaria da gasolio a gasolio-metano (dual fuel) ai sensi della circolare U.d.G. -MOT3 n. 220/M3/C2 del 14.02.2000.





*Ministero
delle Infrastrutture e dei Trasporti*

DIPARTIMENTO PER I TRASPORTI, LA NAVIGAZIONE,
GLI AFFARI GENERALI ED IL PERSONALE
Direzione Generale per la Motorizzazione
DIVISIONE 3

Prot. Ingresso 22413-DIV3-P-910 Roma, 30.11.2015
Prot. uscita 27624

Allegati vari

Alla **ECOMOTIVE SOLUTIONS S.r.l.**
Zona Ind.le Loc. San Iorio, 8 C
15020 Serralunga di Crea (AL)

Oggetto: Ditta **ECOMOTIVE SOLUTIONS S.r.l.**- Serralunga di Crea (AL).

Omologazione complessiva di trasformazione a G.P.L. per veicoli dotati di motori con ciclo diesel. Trasformazione dell'alimentazione originaria da gasolio a gasolio-metano (dual fuel) ai sensi della circolare U.d.G. -MOT3 n. 220/M3/C2 del 14.02.2000.



d-gid® DDF Has Got First HDV Homologations in Greece

ΤΕΧΝΟΛΟΓΙΑ **DUAL FUEL: DIESEL + CNG**

ΜΕΤΑΤΡΟΠΗ ΤΡΑΚΤΟΡΑ ΣΕ ΟΧΗΜΑ ΔΙΠΛΟΥ ΚΑΥΣΙΜΟΥ **ΠΕΤΡΕΛΑΙΟ & ΦΥΣΙΚΟ ΑΕΡΙΟ**



Τη μετατροπή πραγματοποιήσεως επιτυχώς η βιοεναλκοβελτική εταιρεία NET – Natural Gas Technologies, την οποία γνωρίζουμε στην παρούσα έκδοση του T&T Transport Show. Να υπενθυμίσουμε στους αναγνώστες μας ότι έτσι ήδη επιτρέπεται η μετατροπή οχημάτων σε διηλυτό καυσίμου βενζίνης – φυσικού αερίου. Λέγοντας διηλυτό καυσίμου σημαίνει ότι κινούνται ταυτόχρονα και με τα δύο καύσιμα σε συγκεκριμένη αναλογία τα καύσιμα ενώ είναι δυνατή και η κίνηση του οχήματος με το ένα μόνο καύσιμο. Αυτή η υπενθύμιση μας ότι το CNG είναι ο υδρογονάνθρακας μεθάνιο και επειδή (το μεθάνιο), δεν αποτελεί ηρωϊκό διηλυτικό, λέγεται φυσικό αέριο, όταν δε, αποθηκεύεται υπό πίεση παίρνει την γνωστή σε μας αναμείαση CNG.

Κατανάλωση

Για το αποτέλεσμα στην κατανάλωση, το κόστος της μετατροπής και τα βασικά στοιχεία που πρέπει να γνωρίζει ο ενδιαφερόμενος, μετέβα στο T&T e τεχνικές υπηρεσίες της NET κ. Γιώργος Αμπατζίδης και απαντά στις ερωτήσεις μας.

Όπως αναφέραμε, η μετατροπή σε διηλυτό καυσίμου (dual fuel) και πρώτα σε βαρύ διηλυτό, έγινε σε τρακτορά μάρκας DAF XF 105 460 (δικτατορίας του ομίλου FHL NIRMARIS A.E. ενώ

We got the absolute first HDV homologation in Greece released by the Greek Ministry of Transport for our DDF CNG Trucks

σε ένα ρεβά κοκκία ελαστικών με έναρξεως σε μετακίνηση, από δρόμο και σε κίνηση εντός του θύλακα.

Τα πύλα επιτυχύνεται η παραπάνω ανακοίνωση, αποτυπώνεται στην παρακάτω πίνακα, όπου λαμβάνεται ως δεδομένο σύγκρισης, ότι για έναν αντίστοιχο μικτό κωδικό διαδρομίων, το συγκεκριμένο DAF θα είχε κατανάλωση σε πετρέλαιο 40 λίτρα για τα 100 χιλιόμετρα.

DAF XF 105 460					
Euro 5, year 2012, 460 hp					
Diesel tank: 400lt (επιπρόσθετα 2 σε δεξαμενή των 1200 lt)					
CNG tank: 8x70lt (μέγιστη πλήρωση – 70kg)					
Αυτονομία: [σε dual-fuel mode] – 600km					
Πύον		Μικτό			
Diesel		Diesel		CNG	
lt/100km	lt/l	lt/100km	lt/l	kg/100km	kg/kg
40	1.07	22	1.07	12	0.75
-	-	23.54 €	-	9 €	-
-	-	42.8 €	-	32.54 €	-
		-23.97%			

Σημαντικό επίσης στοιχείο που πρέπει να προσέξουμε στην παραπάνω πίνακα είναι η αναλογία μέγιστων δύο καυσίμων που είναι 30 προς 70 (πετρέλαιο προς φυσικό αέριο) και τα γεγονός ότι το μεν πετρέλαιο μετράται όπως γνωρίζουμε σε λίτρα, ενώ το φυσικό αέριο μετράται σε kg.

Τα τεχνικά στοιχεία της μετατροπής και το kit «d-gid»

Το μηχανολογικό εξάρτημα μιας μετατροπής πετρελαιοκινητήρα σε dual-fuel, είναι κοινό με στα bi-fuel (βενζίνη-CNG), δηλαδή φιάλη - αποθήκη βενζίνης - αποθήκη αερίου υγρής πίεσης - πνεύματος - φιάλη καυτήλης - μίξερ. Το εξάρτημα μετά την πνεύματος δε, είναι κοινό και με τα γαζάρια του LPG.

Αυτό που αλλάζει τελείως είναι το ηλεκτρονικό/ηλεκτρονικό μέρος. Ο εγκέφαλος (ECU) d-gid επικοινωνεί με το πατενταρισμένο του πνεύμα του γκαζού αλλά και με την CAN BUS του οχήματος, ούτως ώστε να μεταφέρει να μεταφέρει την έγκριση του πετρελαιοκινητήρα να την ανακαταστήσει στοιχειομετρικά με την ανάλογη και



ΤΜΕ όλα τα εξάρτημα του kit d-gid, καθώς και τη συμμόρφωση μέχρι και για EURO 5, όπως αυτή εκδόθηκε βάσει απαιτήσεων δομημένη από το παλιό ΤΜΕ.

Ασφάλεια-κόστος-φθορές

Για την ασφάλεια της εγκατάστασης, το κόστος και των φθορών, ο κ. Αμπατζίδης μας αναφέρει:

«Η ασφάλεια της εγκατάστασης είναι δεδομένη λόγω της απόλυτης συμμόρφωσης των εξαρτημάτων και των κινήσεων της διασκευής βάσει του R110. Οι συγκεκριμένες εγκαταστάσεις μας δε, έχουν εκπαιδευτεί στην ιταλική νόμοι στο συγκεκριμένο αντικείμενο.

Το κόστος της εγκατάστασης σε ένα ελαφρύ επαγγελματικό όχημα κυμαίνεται από 3.000 έως 4.000 € + ΦΠΑ. Για ένα βαρύ όχημα από 10.000 έως 12.000. Σε κάθε περίπτωση η δικαιολογία οφείλεται στην επιλογή πετρελαιοκινητήρα ή αλλιώς φιάλης



d-gid[®] DDF Has Got First HDV EURO 6 Homologations in Spain



We got the first HDV EURO6 homologation in Spain released by Spanish Ministry of Transport for d-gid DDF Technology

d-gid® DDF System Has Got Homologations also in



Brazil
Argentina
Chile
Turkey
Thailand
South Africa
Emirates
USA
Russia

Diesel Dual Fuel Projects Looking at CNG LNG & Biomethane

Bio-Dual Fuel & Biomethane Project



Biomethane & Diesel Dual Fuel for Agricultural Machinery & Professional Transport

June 2016 Fendt Tractor Tier IV - Diesel Dual Fuel Biomethane



ecomotive solutions
Diesel Dual Fuel
diesel + biomethano

June 2016 Fendt Tractor Tier IV - Diesel Dual Fuel Biomethane

June 2016 a Biomethane test of a Dual Fuel Biomethane Tractor with Ecomotive Solutions d-gid DDF technology started at SESA premises in ESTE (PD)



Swiss Ferry Dual Fuel Projects



We are working on new projects for the conversion of a small passenger boats on Lugano lake Swizerland

Venice experience



Dual Fuel System Application on Express Courier Boats

Natural Gas Engine double wall installation

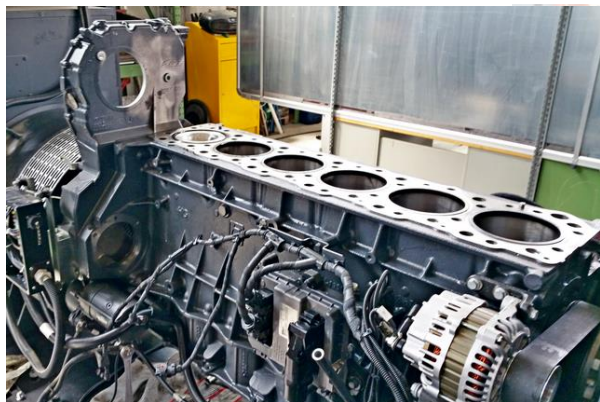


New Railway Dual Fuel Projects



We are working on new EU projects for the conversion of Diesel Trains to Dual Fuel LNG, 2020 target

Natural Gas Spark Ignited Otto Cycle Industrial Engines



Production of a complete line of industrial engines
running with from 14 up to 380kW

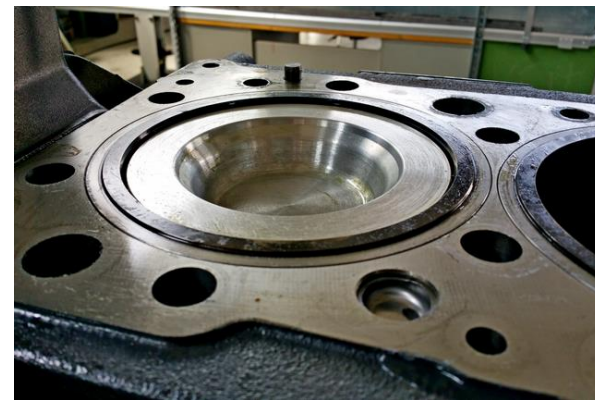
100% Natural Gas

But not only...

Also available for Natural Gas / LPG / Syngas



Omnivorous Engine Program



Diesel Dual Fuel for Generators

d-gid® Genset

*conversion of Diesel generators
to Dual Fuel Natural Gas*



d-gid® Dual Fuel Controller
Intallation




Cylinders Temperature
Active Control



d-gid® Dual Fuel Natural
Gas Mixer





Diesel Dual Fuel (DDF) Case Histories Our Experience Works

Case Histories

Our Experience Works



Santo Domingo DDF CNG Fleet

Case Histories

Our Experience Works



Chile private and public transportation DDF CNG applications

Case Histories

Our Experience Works



Brazil Sugar Can



Brazil DDF CNG Long Distance Bus

Case Histories

Our Experience Works



Turkey long distance DDF CNG bus



Case Histories

Our Experience Works



Turkey some of our CNG DDF conversions

Case Histories

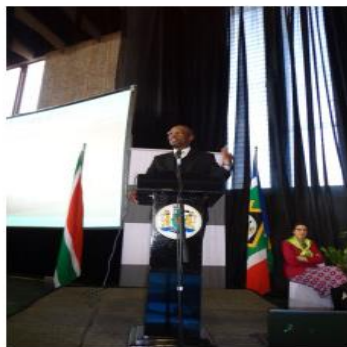
Our Experience Works

Johannesburg Converts 30 Buses to Natural Gas

September 4, 2015 | South Africa, Johannesburg and Italy, Serralunga di Crea



Italy's Ecomotive Solutions, a Holdim Group company and engine calibration specialist, has supported the conversion of 30 buses from the Johannesburg (South Africa) Metrobus fleet into Dual Fuel CNG (compressed natural gas) through its South African partner, Vehicle Gas Solutions. The recent conversion to natural gas is a part of a "Going Green" approach aimed at promoting and incentivizing the use of methane by the urban public transport system in Johannesburg.



Mayor Parks Tau, addressing people during the unveiling of the new Metro busses.



Delegates and commuters who were there to witness a new chapter in the Johannesburg Metro transport system.



The Mayor officially unveils the new busses.

Case Histories

Our Experience Works

Russia our DDF CNG on Iveco



6-9
OCTOBER
2015



THE 5th ST. PETERSBURG
INTERNATIONAL
GAS FORUM

Case Histories

Our Experience Works



Russia our DDF CNG OEM application for Uralaz

6-9
OCTOBER
2015



THE 5th ST. PETERSBURG
INTERNATIONAL
GAS FORUM

Case Histories

Our Experience Works

Green Cranes

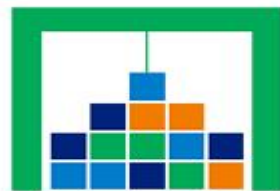
GREENCRANES DEMONSTRATION DAY

Port of Livorno, January the 16th, 2014



First World Natural Gas Diesel Dual Fuel Reach Stacker converted by ECOMTOVE SOLTUIONS

First World Natural Gas Diesel Dual Fuel RTG Cranes converted by ECOMTOVE SOLUTIONS



SEAterminals



Our Membership



THANK YOU

TECHNOLOGIES
TO SUPPORT ECOLOGY

