

ENERGY EFFICIENCY ECOLOGY



3 E³ = ENERGY EFFICIENCY ECOLOGY

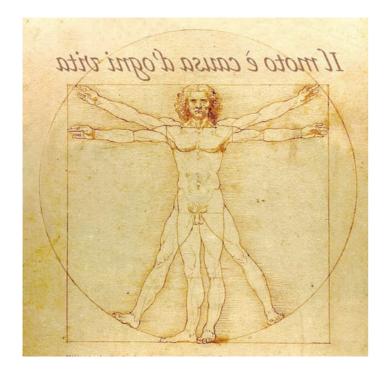
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Mobility, the transport of goods and people, is without doubt one of the more important activities of mankind. Leonardo da Vinci, the great Italian painter, sculptor and scientist, wrote in his Codex Trivulzianus:

"Motion is the basis of all life".

It is also true that transport creates value and consumes resources. In order to make it more sustainable it is possible to improve many of its key elements: from the fuel used to the technologies applied, from vehicle safety to the transport highways.

lveco has taken on board, since its birth, the task to make transport safe, ecological and efficient, making vehicles for more than 30 years passenger and goods transport vehicles and developing technological solutions respecting the environment in which it moves and the man behind the wheel. Indeed, reconciling the growing need for transport with the need to minimise the impact on society and the environment is one of lveco's priority commitments and represents a cornerstone of its business strategy.

The E^3 symbol is the graphic representation, written to be a formula, of this commitment towards a future sustainable mobility.

E³, that is Energy, Efficiency and Ecology represents the values that lyeco is pursuing in order to transform into reality the numerous technological innovations on which it has been working for many years. The objective is one of transforming innovation into a usable reality and within reach of everyone. "Driving Innovation to Reality" is one of the pillars of company policy. Our customers are, as always, essential to this process. All our technological developments, that aim to reduce the environmental impact of road transport, are tried and tested together with customers under real world conditions. A significant number of such developments are already incorporated in the lveco product range.

E³ = Energy

Energy is an essential requirement for all means of transport, indeed for all activities. Today the problem is to contribute to a greater and balanced use of energy produced from renewable sources and to optimise the diminishing sources of traditional energy.

lveco fully supports the use and the diffusion of renewable fuels to satisfy future transport requirements.

E³ = Efficiency

Efficiency is the first and most important mobility element to optimise. The efficiency of an engine has an immediate and direct effect on the reduction of a vehicle environmental impact. The efficiency of the transport operation has a direct bearing on the use of resources necessary to undertake the movement of goods and people. For lveco, all this means above all to produce vehicles that respond to the needs of transport professionals that require reliable, robust vehicles that have an appropriate cost of ownership. Maximising efficiency means a reducing waste to the minimum.

E³ = Ecology

Ecology is one of the most significant aspects relevant to sustainable mobility. Every responsible organisation is aware of its actual ecological responsibilities, that take into consideration the well being of its employees, its customers and of society.

Traditionally, transport has always made a significant environmental impact, and it is for this that the continuing research into innovative solutions in order to respect the evolving atmospheric and acoustic emissions requirements for road vehicles is among the principal objectives of companies in this sector.

For lveco, ecology means respect for the environment in which we all live, but also for the driver and fleet operator. lveco is aware of its ecological role and guarantor of the well being of its employees, its partners, its customers and of its suppliers.

Respect for the environment also means ensuring sustainable manufacturing processes, from the conception of its products to the end of their life. In conclusion, for lveco, the symbol E^3 means to offer products to its customers that associate efficiency and productivity to respect for the environment, with particular regard to fuel consumption.



INNOVATION FOR SUSTAINABILITY

Innovation and sustainability are two inseparable concepts. It is therefore important to clarify from the start just what lveco means by innovation:

"Innovation is a product of methodological novelty, that introduces a discontinuity serving to improve customer satisfaction and the requirements of sustainable mobility."

Our innovation process is based on a clear set of processes, focused on satisfying our product development, design activities and production methods. Creativity is encouraged at all levels, but only the best ideas, those meeting the stringent standards of technological and economic feasibility, will go forward to become product developments and will become realised for our customers.

The technical innovation plan is organised in the fol-

lowing four pillars for product development:

- environment
- safety
- productivity
- performance

and for methodological innovation, into the following elements:

- product development procedure
- virtual analysis
- measurement and verification of performance
- integration of product and process

Confirming that innovation is part of lveco's DNA, it is sufficient to note that the company offered vehicles to its customers, already compliant with Euro V emissions levels four years before its mandatory introduction date, which currently offers a wide range of products conforming to the EEV (Enhanced Environmentally Friendly Vehicle) standard, the most stringent available European standard. In 1986 the first Daily electric vehicle was made available and now Diesel-electric hybrid vehicles have become a reality consolidated and tested by several large customers in urban transport.

Innovation in telematics is represented by the Blue & Me Fleet system, a telematics package offered in collaboration with Qualcomm, industry experts in mobile vehicle communications for fleet management, thus generating a new application system developed by Fiat Group and Microsoft that has changed the paradigms of vehicle communication services. Blu&Me Fleet is developed on the Qual-

comm's FleetVisor[™] mobile communication platform, able to provide a sophisticated Internet based vehicle management system.

The acronym guiding lveco's innovation in terms of active safety is ADAS or Advanced Driver Assistance Systems, that is all those systems and devices for driver assistance to help prevent road accidents. There is ample evidence that the main cause of road accidents is human error. These systems serve to help prevent possible accidents due to inappropriate behaviour, lack of competence, fatigue or simple misjudgement. Such systems include such features as ESC (Electronic Stability Control); ACC (Adaptive Cruise Control); LDWS (Lane Departure Warning System).

The philosophy of lveco's innovation extends naturally to special vehicles, for which it has developed

the most advanced technologies in the field of fire fighting applications, off-road quarry and construction applications, defence and civil protection. In particular lveco is a global leader in the production and sales of fire appliance ladders with the most advanced patents in the world, while military vehicles are equipped with the latest crew protection technologies in this sector. The LMV (Light Multirole Vehicle) vehicle, destined for tactical military and defence roles and peacekeeping, represents an excellent example in the defence sector. Totally designed and built by lveco Defence Vehicles, it uses sophisticated technology whose strengths are high mobility and IED protection.

Very important for the entire lveco innovation process is the methodological approach we call the "democratisation of innovation." Our company, in fact, no longer only rely on its own ability to carry out research and development, but can count on customers, end users, suppliers, public and private institutions, research centres and universities in a win-win process in which all stakeholders become actors of change.

As evidence of the commitment that the company has always dedicated to innovation, both to the product and the processes, lveco has recently been awarded the "*Enterprise Award for Innovation*", a prestigious award given by Confindustria to those companies with the most advanced innovation processes.

Group Synergies for Innovation

lveco's environmental commitment is part of a broad approach to the sustainability of the entire Fiat Group. Innovative technologies developed for one sector are in fact made a common factor so that they can be shared. Optimisation projects in fuel consumption, or other technological innovations tested in the field, are used in all other sectors of the Group.

Common Rail and Multiair, for example, are just some of the technological innovations developed within the Fiat Group by CRF (Fiat Research Centre) and FPT (Fiat Powertrain Technologies). With this series of innovations the Diesel engine has been completely renovated in recent years, achieving excellent results in terms of engine efficiency, low noise and operating costs. The impact of these innovations on the environment in terms of reducing emissions is actually enormous, and the difference between today's emission levels compared to the first Diesel engines is little short of incredible.

The research into the optimisation of the Diesel engine continues with the objective of reducing emissions and fuel consumption. In parallel, numerous innovations in the field of alternative energies and traction systems are being developed.

The Fiat Research Centre adopts a systems approach designed to explore innovative solutions that express a concept of full circle mobility: the main objectives are to limit fuel consumption and CO₂ emissions with innovative engine technologies, but also improve the efficiency of vehicle achieved by exploiting the use light weight materials, improved aerodynamics, the mobile information applications, the use of ecological materials and recyclability.

A WIDE RANGE OF TECHNOLOGICAL SOLUTIONS

Iveco has a number of technological solutions differentiated according to specific customer requirements in relation to different vehicle applications. The Iveco range of environmentally friendly products is very wide; the company decided to invest in different technologies, aware that a single unique solution applicable to the needs of sustainable transport does not exist.

Vehicles with diesel engines, which represent the most important current and widespread engineering solution, are those on which the company works daily to improve the efficiency and technical features with excellent results.

The alternative traction solutions represent the most advanced research with particular reference to aspects of sustainability, each with a specific mission.

Electric vehicles are particularly well suited to urban use, while hybrid and natural gas can be used with profit, even for medium-distance transport.

These different solutions are still a part of lveco's product range.



When one takes into account the need for diversification of energy supply and the great care that must be taken over the quality of the air in urban areas, it is clear that alternative fuels have an important role to play in our future.

In this area, lveco has always attributed great importance to natural gas, and now offers the most extensive range of CNG vehicles on the market. The use of natural gas vehicles is an investment not only of great social value but also of economic value to the customer. As well as having a lower cost and giving lower consumption, in many countries methane propulsion also benefits from purchasing incentives. Natural gas vehicle technology is an Italian tradition and, since the 80s, has been given priority in lveco's research into the production of ecological vehicles. lveco is the European leader in the production and sales of these vehicles: trucks, vans and buses de-

signed for all kinds of work and, in particular, for urban use.

Even though lveco vehicles with Diesel engines that conform to the European EEV standards already have very low emission levels, those with natural gas engines already approach and sometimes surpass the limits in the proposed Euro VI standards, which will be applied to heavy goods vehicles and buses as from 2013. This means that lveco is already in possession of the technology necessary for the next decade.

Furthermore, the stoichiometric combustion system (with chemically correct air-fuel ratio) chosen for FPT natural gas engines with a 3-way exhaust catalyst, has reliability and durability characteristics that have been tested and tried for years on light transport vehicles. What distinguishes this system from others is that it is able to adapt itself according to the composition of the gas used so that the engine maintains its low emission levels without affecting performance.

Tthe positive ignition makes engine noise emissions lower than that of Diesel engines of the same size. According to trials conducted in the EU Fideus project (Freight Innovative Delivery of Goods in European Urban Space), these vehicles are particularly suitable for night use in urban areas, without requiring any further noise insulation measures.

lveco CNG engined vehicles are already capable of using bio-methane, the most available of truly renewable fuels offering outstanding global warming credentials. lveco is also conducting vehicle trails with Hydro-Methane, a mixture of natural gas with 30% of the total being hydrogen. With sustainably sourced hydrogen, this gas offers even further reductions on emitted CO₂. lveco, a front runner in this kind of technology, developed and built the first electrically propelled Daily in 1986 and the range has now been extended to include vans, buses and urban buses.

ECODaily Electric is the light commercial vehicles with zero emissions, designed, manufactured, sold and serviced totally by lveco. The asynchronous three-phase traction motor controlled by means of the DC/AC inverter serves to provide effortless driving and range extending regenerative braking. Motor power is 30kW continuous (60kW peak) for 35S models and 40kW continuous (80kW peak) for 50C models. Testament to Daily's rugged chassis construction, all drive components and batteries are housed either in the engine compartment or within the chassis side rails, there is absolutely no compromise in load space. This is possible because ECODaily Electric is designed by lveco, constructed by lyeco and sold by lyeco bringing further advantages regarding both planned and unplanned service – there is one supplier, one invoice, one warranty account should the need arise. At the end of the vehicle's life, recycling is not compromised; the Zebra batteries are completely recyclable – zero emissions with positive recycling credentials.

The electrical architecture and control incorporating a dedicated electronic controller with in-vehicle communication using the CAN network has been totally developed within lveco and is serviced directly within the lveco network. A CAN display installed in the instrument cluster provides the driver with relevant information concerning the correct management of the vehicle such as battery state of charge, system voltage, temperature, traction current and diagnostic information in the event of a system malfunction. Power supply is by Zebra Z5 traction batteries using the proven Na/NiCl₂ technology which are fully sealed and



Pure Electric Traction for Commercial Vehicles

do not produce gaseous emissions, do not require maintenance and are totally recyclable. On board battery charging is provided by means of a standard three-phase 380V/32A supply and requires 8 hours to fully charge the traction batteries. This provides a useful vehicle range of between 90km and 130km, depending on the number of batteries specified and the vehicle mission. These are actual distances established during evaluation trials and are repeatable. The vehicle is driven exactly like a conventional vehicle fitted with an automatic transmission, that is with only accelerator and brake pedals and a transmission lever indicating forward, neutral and reverse. Vehicle control is managed by the traction inverter based on brake and accelerator pedal sensors indicating the driver's needs. The electric Daily maximum road speed is electronically limited 70 km/h. This maximum speed can be calibrated at a lower level to even further improve the vehicle's

useful range. The vehicle is perfectly specified for urban missions such as door to door collection and deliveries and for passenger transportation. ECO-Daily 35S Electric models have two batteries with a third optionally available on long wheelbase models and 50C models have three batteries with a fourth optionally available, again depending on wheelbase.



DIESEL – ELECTRIC PARALLEL HYBRID TRACTION

For vehicles that live and work in the city and never leave, pure electric traction provides excellent benefits, for the operator and for society as a whole. Where the vehicle is required to leave the city, where range and performance are key operational needs, the Diesel-electric hybrid drive provides an excellent solution. With traction either wholly by electric motor, wholly by Diesel engine or by a combination of the two, what appears at first sight to be a compromise is nonetheless an exciting innovative solution. It brings outstanding benefits both in ease of driving and in fuel economy savings of up to 30%, depending on mission, compared to conventional power train solutions. This is achieved in three important ways:

 Regenerative braking system. The electric traction motor under overrun conditions or vehicle braking functions as a generator and the kinetic energy of motion is converted to electrical energy to charge the traction batteries.

- Stop and Start function. When coming to rest the Diesel engine is automatically switched off. Starting from rest is initially by electric motor only and the Diesel engine is started automatically according to vehicle road speed and driver acceleration demand (indicated by the accelerator position).
- Down-sized Diesel engine. Like most mechanical devices, engine efficiency increases as a function of power demand or load. Usually, the Diesel engine chosen for a particular application will have sufficient power to cater for all needs. With a Diesel-electric parallel hybrid, the use of a down-sized engine covers most needs but the extremes of power required for high rates of acceleration or for the steepest of hills can be met by the Diesel engine working in parallel with the electric motor.

With these features, urban driving in which there is a high degree of stopping and restarting provides the greatest fuel economy savings while the vehicle is equally at home on the motorway between cities, functioning with the flexibility that is expected of a commercial vehicle.

ECODaily Hybrid

The ECODaily Diesel-electric parallel hybrid vehicle is equipped with the 16-valve 2.3 litre 4 cylinder FPT Diesel engine of 116cv (85kW) together with a three-phase synchronous electric motor-generator with a maximum power rating 43cv (32kW). The Agile gearbox acts as an interface between the engine and the electric traction control systems and automates gear and clutch shifts on the basis of driver requirements. The vehicle actually drives in a very similar way to a conventional vehicle with automated transmission. The electric traction is powered by high specific energy batteries and the system operating features include the three key operating parameters considered above. With a maximum speed of 130 km/h, the parallel hybrid Daily is suitable for both urban and extra-urban work and gives a vehicle range limited only by the capacity of the Diesel fuel tank.

Eurocargo Hybrid

The new Eurocargo Hybrid, available at 7.5t and 12t maximum permitted mass, has a Diesel-electric parallel hybrid driveline, making it possible to do goods distribution and collection work in towns without

sacrificing high-speed performance on motorways, with fuel consumption savings of up to 30% compared to conventional Diesel engined vehicles, depending on vehicle mission. The 7.5t version uses the 16-valve, 4-cylinder Tector Euro V Diesel engine with maximum rated power of 160cv (118kW) working in combination with a 60cv (44kW) maximum rated power electric motor-generator, a 6-speed automated gearbox and a lithium ion battery pack of rated capacity 1.9 kWh. System operating features include starting from a standstill in electric mode only, automatic starting of Diesel engine on the basis of driver performance requirement, power assist from electric motor during acceleration and climbing, Stop & Start function and regenerative braking.

The 12t version uses the 16-valve, 4-cylinder Tector Euro V Diesel engine with maximum rated power of 180cv (134kW) with transmission and battery specifications as for the 7.5t version. The payload is only 200 kg less than conventional Diesel engined models. A further innovation in this vehicle is the automatic engagement of the engine brake during deceleration, in advance of the application of the foundation brake.

Diesel – Electric Series Hybrid Traction

Ideal for passenger transport in urban areas without limitations on range is the Diesel-Electric series hybrid power train; essentially an electric traction system with an on-board battery charger. Sharing the energy saving features of the pure electric versions such as kinetic energy recovery, the series hybrid power train achieves fuel consumption savings in excess of 30% compared to a conventional Diesel engined vehicle, depending on vehicle mission. Ideally suited to urban public passenger transport operating on fixed routes permits an optimised calibration of the power train to achieve the greatest savings. Iveco is active in this field since the mid 1990s with many examples of both 6m, 7.4m and 12m buses operating in French, Italian and Spanish cities. 6m versions use a 1.2 litre Diesel engine with 43 kW electric motor while 7.4m and 12m versions use a 2.8m Diesel engine with 150kW electric motor for 7.4m versions and 164kW electric motor for 12m versions.

A COMPLETE OFFER

The transport world is rapidly changing, and customer demands, which are becoming more demanding and have become increasingly diverse and complex. To the many questions of transport professionals are so many answers that lveco's strong experience in continuous evolution, can now offer the most extensive and articulated proposals in the world.

As always, therefore, customer satisfaction is a fundamental of lveco's product development activities. The E^3 symbol reflects the entire objective of the company to market products that are high in innovation, in line with the constraints of mobility ever more sustainable, but with a realistic and pragmatic approach.

lveco research on alternative fuels and alternative traction is therefore complementary to the entire product range equipped with Diesel engines, all already meeting the EEV standard, the most stringent available. Iveco also supports the development of so-called second generation of bio-renewable fuels, derived from HVO (hydrogenated vegetable oil) and BtL (biomass to liquid).

Also be added to this cutting edge technology is the Agile automated transmission for the light range, and Eurotronic for medium and heavy range vehicles, which contribute decisively to reduce consumption and make driving more comfortable and less tiring.

lveco offers value and ecological solutions to the customer, with which it contributes to the creation of the future of road transport, taking an open attitude towards the ongoing research for alternative technological solutions, which use innovative fuels traction systems, but also staying focused on the development of systems allowing reductions in fuel consumption and operating costs. A complete offer

In conclusion lyeco is now more than ever able to satisfy the most varied and complex needs of transport professionals with a range of eco-friendly products, the most able in the sector in scope and capacity of response to the specific technology application for those who make deliveries (from urban distribution to international transport operator) for those carrying goods (from food to building materials) for those transporting people (from school to scheduled urban and inter-urban services. from vehicles equipped for handicapped persons to luxury airports and hotel shuttles), without forgetting those who use a camper, obviously based on an lveco chassis, to enjoy leisure time.

ECODAILY

MODEL	ENGINE	TRANSMISSION	WHEELBASE	FUEL TANK
ECODaily 35S14G Van	FPT 3.0 litre	FPT 2840.6 speed	3300 mm 3950 mm	196 litre 246 litre
ECODaily 35S14G C/Cab	136 cv (100 kW)	ZF 6AS400 AGile	3450 mm 3750 mm	196 litre 196 litre
ECODaily 35S14G Van	— FPT 3.0 litre 136 cv (100 kW)		3300 mm 3950 mm	194 litre 246 litre
ECODaily 35C14G C/Cab		FPT 2840.6 speed ZF 6AS400 AGile	3450 mm 3750 mm 4100 mm	194 litre 220 litre 220 litre
ECODaily 40C14G Van	FPT 3.0 litre 136 cv (100 kW)	FPT 2840.6 speed ZF 6AS400 AGile	3300 mm 3950 mm	194 litre 246 litre
ECODaily 40C14G C/Cab			3450 mm 3750 mm	194 litre 220 litre
ECODaily 50C14G Van	— FPT 3.0 litre 136 cv (100 kW)	FPT 2840.6 speed ZF 6AS400 AGile	3300 mm 3950 mm	194 litre 246 litre
ECODaily 50C14G C/Cab			3450 mm 3750 mm 4350 mm	194 litre 194 litre 272 litre
ECODaily 65C14G C/Cab	FPT 3.0 litre 136 cv (100 kW)	FPT 2840.6 speed	3450 mm 3750 mm	194 litre 194 litre
ECODaily 70C14G C/Cab		ZF 6AS400 AGile	4350 mm 4750 mm	272 litre 272 litre

EUROCARGO

STRALIS

MODEL	ENGINE	TRANSMISSION	WHEELBASE	FUEL TANK
EUROCARGO 110EL20 CNG	_	ZF 6S700 TD 6 speed ZF 9S75 TD 9 speed Allison Auto 6 speed	3105 mm 3300 mm 3690 mm	
EUROCARGO 120EL20 CNG	 – FPT Tector 6 		4185 mm 4455 mm 4815 mm	
EUROCARGO 150E20 CNG	200 cv (147 kW)		3690 mm 4185 mm 4455 mm	480 litre
EUROCARGO 160E20 CNG			4815 mm 5175 mm 5670 mm 6570 mm	

MODEL	ENGINE	TRANSMISSION	WHEELBASE	FUEL TANK
			3800 mm	600 litre
			4200 mm	
STRALIS AD190S27		ZF 16S1621 TD 6 speed Allison Auto 6 speed	4500 mm	640 litre
	FPT Cursor 8 272 cv (200 kW)		5100 mm	640 little
			6300 mm	
			3120 mm	
			3800 mm	640 litre
STRALIS AD260S27YPS			4200 mm	960 litre optional
			4800 mm	you nere optional
			5100 mm	
			4200 mm	640 litre
			4500 mm	01011010

ECODAILY ELECTRIC

EUROCARGO HYBRID

MODEL	MOTOR	BATTERIES	TOP SPEED	GRADEABILITY	_
ECODAILY 35S ELECTRIC	Async. 3 phase 30 kW continuous 60 kW peak	Zebra Z5 Na/NiCl2 2 pack std/3 pack opt 21.2 kWh capacity/pack			
ECODAILY 50C ELECTRIC	Async. 3 phase 40 kW continuous 80 kW peak	Zebra Z5 Na/NiCl2 3 pack std/3 pack opt 21.2 kWh capacity/pack	70 km/h	16% laden	

MODEL	DIESEL ENGINE	TRANSMISSION	MOTOR/ GENERATOR	BATTERY
EUROCARGO 75E16 HY	4 litre 118 kW	Eaton AMT 6 speed	IPM 44 kW	Single Li Ion 340 V 1.9 kWh
EUROCARGO 120E18 HY	4 litre 134 kW	Eaton AMT 6 speed	IPM 44 kW	Single Li Ion 340 V 1.9 kWh

BUSES

ECODAILY HYBRID

MODEL	DIESEL ENGINE	MOTOR/ GENERATOR	TRANSMISSION	BATTERY	SUPER CAPACITOR
ECODAILY 35S12 HY	2.3 litre 85 kW	Sync. 3 phase 32 kW	AGile	Single NiMH 340V 7Ah	12 V 250 F

MODEL	No. PASSAN.	DIESEL ENGINE	GENERATOR	MOTOR	BATTERY	PERFORMANCE
ALTROBUS 6m	21	1.2 litre	Perm Magnet 11 kW	DC 43 kW	20 kWh	Vmax 60 km/h Grad. 16% laden
ALTROBUS 12m	86	2.8 litre	Perm Magnet 30 kW	Asynv 3 phase 164 kW	60 kWh	Vmax 62 km/h Grad. 16% laden
EUROPOLIS 7.4m	40	2.8 litre	Perm Magnet 30 kW	Asynv 3 phase 150 kW	40 kWh	Vmax 62 km/h Grad. 16% laden
CITYCLASS 12m	88	2.8 litre	Perm Magnet 30 kW	Asynv 3 phase 164 kW	60 kWh	Vmax 62 km/h Grad. 16% laden

PHOTO GALLERY

ECODAILY ELECTRIC



ECODAILY HYDRO-METHANE ECODAILY HYBRID









C01

C02



D01

ECODAILY NATURAL POWER





B02

B01







ECODAILY E01



D02

F01

F02

EUROCARGO HYBRID





F03



STRALIS CNG

G02



BUSES







H02

A01





EUROCARGO STRALIS

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