

# ►Hybride HDi◄

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## INTRODUCTION

Reducing CO<sub>2</sub> emissions is the major environmental challenge facing automobile manufacturers today. High fuel prices, coupled with consistently high oil prices in the foreseeable future, give them added incentive to act now.

This challenge has long been central to PSA Peugeot Citroën's product development strategy which is anchored in a proactive commitment to the environment and has generated very tangible results.

### ■ Diesel engines, promoting fuel efficiency and CO<sub>2</sub> emissions reductions

Replacing a petrol engine with an equivalent diesel powertrain can reduce fuel consumption by as much as 25%.

### ■ A responsible environmental policy requires that appropriate technologies are deployed on large numbers of vehicles

In the last four years, PSA Peugeot Citroën has sold more than 1,100,000 low-emission, fuel-efficient vehicles in Europe (less than 120 grams of CO<sub>2</sub> per kilometre and 4 to 4.5 litres per 100 kilometres). PSA Peugeot Citroën can claim for 2005 a 30% European market share of under 120 g/CO<sub>2</sub> car sales and over 60% market share for all car sales with 110 g/CO<sub>2</sub> or under. The group European market share for that same year is of some 15%. This makes PSA Peugeot Citroën one of the world's leading manufacturers of environmentally-friendly vehicles.

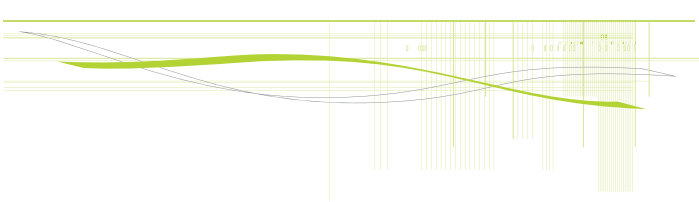
These results are based on offering affordable vehicles to the largest number of people, in keeping with the Group's position as a volume manufacturer.

### ■ A multifaceted approach to managing CO<sub>2</sub> emissions

There are a number of ways to meet this challenge, depending on the specific characteristics of markets worldwide, in particular the energy resources and energy strategies used by individual countries.

Already a pioneer in electric vehicles, PSA Peugeot Citroën also tailors its product ranges to different markets, offering vehicles that run on natural gas and biofuels, such as biopetrol and biodiesel.

Looking much further ahead, the fuel cell offers excellent potential, and technological developments in this area are being actively monitored.



In the nearer future, hybrid vehicles – which combine an internal combustion engine(ICE) with an electric motor – will offer very real advantages, despite costing much more than conventional powertrains. The Group has been exploring this technology for over a decade.

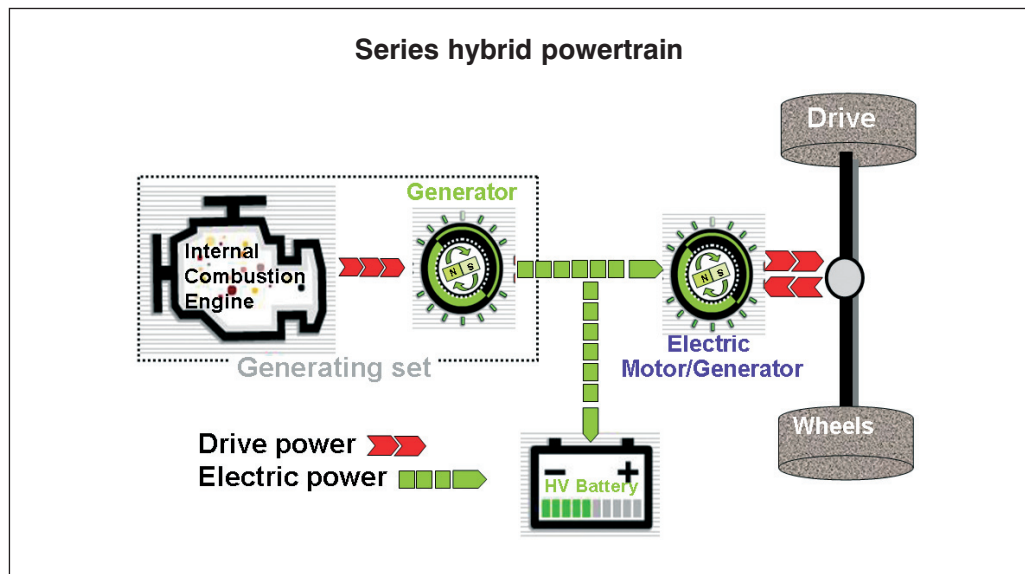
Hybrid technology using a petrol engine is not very competitive financially, and does not offer significantly better fuel economy or CO<sub>2</sub> emission performance than a conventional HDi diesel engine. However, PSA Peugeot Citroën believes that combining a hybrid powertrain with an HDi engine would constitute a step change in terms of improved fuel economy and lower CO<sub>2</sub> emissions in Europe, where diesel engines are already widely used.

This avenue is being pursued vigorously. PSA Peugeot Citroën has today unveiled two diesel hybrid demonstrators, built under the Group's platform strategy, together with details of their very promising preliminary results in terms of fuel efficiency and CO<sub>2</sub> emissions.

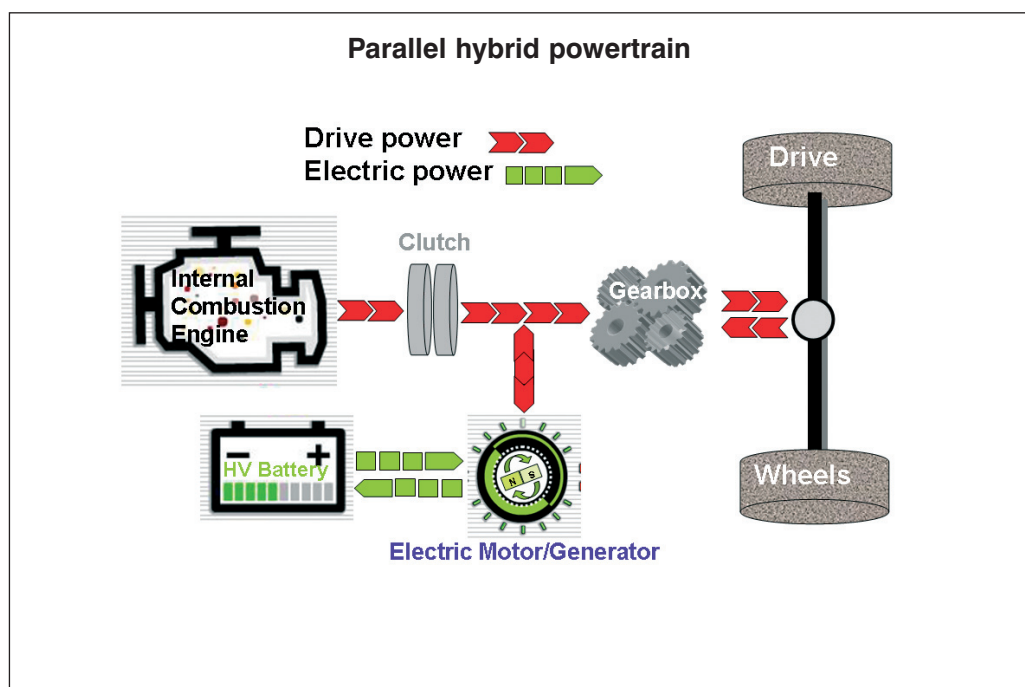
# I. HYBRIDE HDi: A HIGH-PERFORMANCE POWERTRAIN

## THREE TYPES OF HYBRID VEHICLE

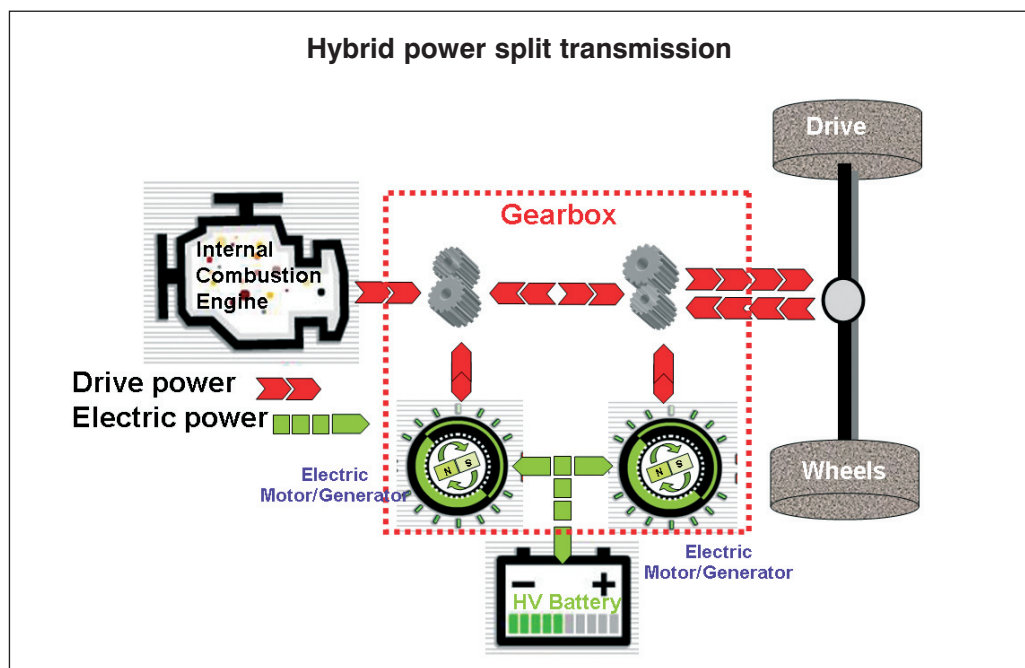
- **Series hybrid:** In this configuration, the internal combustion engine (ICE) drives a generator to produce electrical power. The electric motor uses this energy and the battery to drive the vehicle.  
In other words, there is no mechanical link between the ICE and the wheels. The long energy conversion chain (thermal → mechanical → electrical → mechanical) reduces the efficiency of this type of powertrain.



- **Parallel hybrid:** In this configuration, the ICE drives the vehicle. The engine is connected to a conventional gearbox, but the vehicle is also equipped with an electric motor powered by batteries. The batteries are recharged by kinetic energy recovered during deceleration and braking. The electric motor is used to drive the vehicle mainly during situations where the ICE is least efficient, i.e. at low loads.



- Hybrid power split transmission:** This powertrain operates in the same way as the parallel hybrid but has a fully dedicated gearbox equipped with electric motors that are essential for operation. The power delivered by the ICE follows two distinct paths, one mechanical and one electrical. Use of the electric motors restricts gearbox efficiency under certain circumstances, especially during phases requiring maximum engine power. As in the parallel hybrid powertrain, a vehicle can run in a full electric mode.



## PSA PEUGEOT CITROËN OPTS FOR A PARALLEL HYBRID SYSTEM

PSA Peugeot Citroën has developed a parallel hybrid diesel powertrain for the Peugeot 307 and the Citroën C4.

This choice is compatible with the platform strategy, allowing as many major components as possible to be carried over, in particular the engine and gearbox. Since the power is primarily transmitted from the ICE to the wheels through an efficient mechanical connection, the vehicles offer a remarkable fuel economy whatever the driving conditions (road, motorway, mountain, towing, etc).



## ■ Reasons for selecting a diesel engine

Research by PSA Peugeot Citroën shows that fuel economy for a petrol hybrid vehicle is similar to a conventional diesel-powered vehicle of identical proportions, such as weight, size and maximum cross section, while its CO<sub>2</sub> emissions are around 10% lower. A hybrid petrol vehicle is, however, significantly more expensive than an equivalent conventional diesel vehicle.

High-tech diesel engines (HDi) have grown steadily more popular in Europe since the late 1990s. One out of every two passenger cars bought is now equipped with a diesel engine, compared with one out of four in 1998. In some countries, including France, the percentage of diesel cars reached 70% in 2005. This ongoing growth shows that there is strong consumer demand for vehicles that are both affordable and offer low fuel consumption without compromising driving comfort. Furthermore, with the advent of PSA Peugeot Citroën's pioneering of the diesel particulate filter system (DPFS), now fitted to more than 1.3 million vehicles across both brands, diesel engines have gained a yet more environmentally friendly reputation.

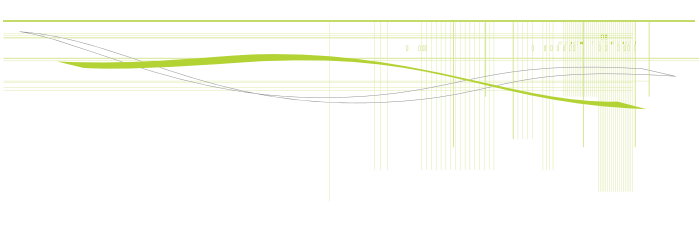
Understandably, therefore, petrol hybrid vehicles have failed to take off substantially in Europe, despite the significant tax incentives introduced in various European Union countries.

A diesel hybrid could however provide a step change in terms of fuel economy, because it combines the exceptional efficiency of the diesel engine, used over its optimum operating range, with an electric motor suited to urban driving.

## ■ Hybride HDi: ambitious objectives, including fuel efficiency of less than 3.5 litres per 100 kilometres

Right from the outset, the Group's engineers set some very ambitious goals. The most important was to integrate hybrid HDi technology in mass-produced family vehicles, in line with the Group's platform strategy.

Because of the advantages of hybrid technology in both urban and motorway driving, the homologated combined cycle of **3.4 litres** per 100 kilometres has been achieved, representing **90 grams of CO<sub>2</sub>** per kilometre from tank to wheel – a significant breakthrough. This is some 25% better than a similar vehicle equipped with a petrol hybrid system: in fact almost 1 litre per 100 kilometres better, significantly extending these vehicles ranges. For motorway driving, the intrinsic properties of the conventional 1.6-litre HDi engine used on its own, along with its high-efficiency electronically-managed gearbox, also deliver fuel savings of 25% over the petrol hybrid.



Last but not least, the Hybride HDi does not compromise driving comfort. In fact, vehicles with Hybride HDi powertrains offer users greater driving comfort in two areas:

- At low driving speeds by offering much lower noise and vibrations achieved by shutting down the ICE and operating on electric power alone (Zero Emission Vehicle, or ZEV).
- Significantly improved pedal response compared to an equivalent ICE-powered vehicle – drivers of Hybride HDi vehicles will enjoy the power boost delivered by an electric motor rated at up to 23 kW of power.



## II. HYBRIDE HDi POWERTRAIN COMPONENTS AND INTEGRATION IN THE PLATFORM STRATEGY

PSA Peugeot Citroën's Automotive Research and Innovation Division undertakes projects designed to provide drivers with innovative, useful solutions, while remaining affordable – in line with the product offerings of its two brands.

The Hybride HDi project has aimed to meet these objectives throughout its development by leveraging the Group's sound knowledge of hybrid systems.

The Hybride HDi therefore extensively carries over existing components and assemblies, as well as implementing technical solutions that have been proven in series production and adapted for hybrid technology.

### MAIN HYBRIDE HDi POWERTRAIN COMPONENTS

#### ■ ICE and pollution control system

For the hybrid system, the Group selected a high-tech engine from its “organ bank”, the 1.6-litre (66 kW) HDi, coupled for the first time with the latest generation Stop & Start system.

The engine was modified to make it compatible with a hybrid powertrain.

In particular, it has a dedicated control system, using operating instructions coordinated directly by the powertrain management unit (PTMU), most notably for engine starts and stops, while also guaranteeing delivery of the torque required by the driver.

Furthermore, to ensure unrivalled emissions performance, the engine has been equipped with the latest-generation diesel particulate filter system (DPFS) to exceed Euro IV standards.

The trade-off between fuel efficiency and NOx emissions is improved due to the degree of freedom provided by a hybrid configuration, especially management of engine shutdown time, as well as the possibility of using the engine at its most efficient operating points by adding the capabilities of the electric motor.



### ■ Electronically-managed gearbox

The Hybride HDi uses a 6-speed electronically-managed gearbox. By automating a manual gearbox – without clutch pedal – this unit offers excellent efficiency. The hydraulic control of the gearbox reduces the time needed to shift gears, for easier use. At the same time, it continuously controls the powertrain by selecting the best operating point in real time. In other words, the electronically-managed gearbox delivers the best trade-off between fuel economy, acceleration, braking, driving comfort and pollution control. It also allows the driver to select either automatic or sequential gear changes.

Engineers had considered an automatic gearbox, but decided against it after analysing operating conditions. Efficiency would have been compromised because of the many sources of friction and the hydraulic components needed for an automatic gearbox, which was deemed unacceptable in a project that is aiming for very low fuel consumption.

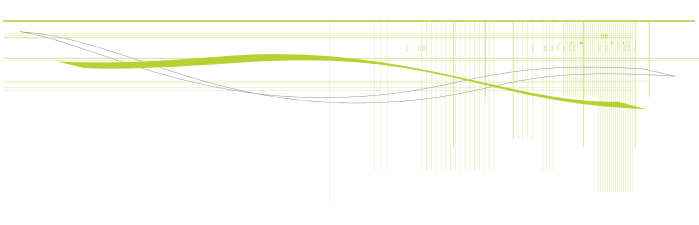
### ■ Stop & Start system

The Stop & Start system used in the Hybride HDi powertrain is based on the technology integrated in both the Citroën C2 and C3. The new system has 40% more power than the first generation, for easier starting of the 1.6-litre diesel engine.

In the hybrid powertrain, the Stop & Start system restarts the ICE. While the Stop & Start function is only used on the C3 when the vehicle is stationary, the engine stop function can occur at any given moment on the Hybride HDi, as soon as the vehicle's speed falls below 60 kilometres an hour.

### ■ Electric motor and inverter

The electric motor develops 16 kW of continuous power, with 80 Nm of torque. It offers peak power of 23 kW and 130 Nm to meet occasional demand from the driver. A design trade-off (volume/performance) ensures the system's compatibility with urban driving. Power levels were determined to ensure that the all-electric mode would be used for speeds up to 50 kilometres per hour, which is typical of urban driving. The hybrid powertrain control system selects this configuration whenever allowed, for example when the batteries are charged sufficiently.



The electric motor is a synchronous permanent magnet type. This technology currently offers the best performance/size ratio. Connected to the inverter, it operates in a voltage range from 210 to 380 volts. In the restricted space available, this electric motor/inverter does not enable use of the conventional engine cooling circuit, whose typical temperature is too high. Water cooling is therefore provided by a special radiator and a low-temperature cooling circuit at 60°C.

The inverter controls the electric motor's torque by controlling the current from the battery pack, in the same way as a conventional fuel pump delivers fuel to the engine when the driver presses on the accelerator.

### ■ High-voltage batteries

The high-voltage battery pack fits in the rear part of the Group's platform 2 vehicles (base for the Peugeot 307 and Citroën C4), in place of the spare tyre, following a slight modification to the cut-out in this compartment. Adding the batteries does not reduce boot capacity for any of the vehicles.

The battery pack consists of 240 Ni-MH (Nickel-Metal Hydride) cells that deliver 23 kW of power at a nominal voltage of 288 volts. The cells are cooled by special air intakes that recover air from the passenger compartment, taking advantage of its temperature control.

There is also a conventional 12V storage battery, which continues to handle its usual functions.

### ■ Controlled regenerative braking

During certain vehicle deceleration or braking phases, the controlled braking system maximises the conversion of kinetic energy into electrical energy, which is stored in the high-voltage battery pack.

The energy can then be used by the electric motors, either in all-electric mode or as a boost to the ICE during acceleration.

Recovering energy in this way provides a "free" source of energy, further enhancing overall fuel efficiency.



## HOW THE HYBRIDE HDi OPERATES

### ■ A driver friendly system

Turning the key in the ignition energises the vehicle without starting the ICE. When the driver presses the accelerator pedal, the electric motor can propel the vehicle on its own, depending on the pressure on the pedal. If strong acceleration is required, it may be supplemented by the ICE. The electronically-managed gearbox provides the efficiency of a manual unit, while also offering the automation required to control the hybrid powertrain. The decision to shift gears and the actual gear change is done automatically, unless the driver chooses the sequential mode.

All of these operations are coordinated without driver intervention by the powertrain management unit (PTMU).

### ■ Choice of propulsion modes

Depending on the driver's actions, the PTMU selects the operating mode providing the lowest fuel consumption. This is generally achieved by using the electric motor on its own at low speed and during deceleration, the ICE on its own on main roads and motorways, or both when greater acceleration is required.

### ■ Smart braking control

One of the features of the hybrid system is to recover kinetic energy from the vehicle and subsequently re-use it. When the driver lifts his/her foot from the accelerator at a speed of less than 60 kilometres an hour, the ICE is shut down and disconnected. At this point, the electric motor provides engine braking and recovers the vehicle's kinetic energy. The PTMU stores the energy in the batteries, until they are fully charged in a best case scenario.

During braking, the PTMU manages the distribution between electrical braking (regenerative) and hydraulic braking (dissipative), while ensuring that safety functions are given priority. It also optimises energy recovery to enhance fuel economy.



### ■ **Control screen**

The driver is given real-time information on the operation of the hybrid powertrain through a multifunction colour display screen. Originating from the telematics structure of the group, it provides an easily understandable display of the energy transfers between the ICE and electric motor, the battery pack and the wheels. Other information is also displayed such as the battery charge level and the power that the driver requests from the different powerplants.

By improving the driver's understanding of how the vehicle operates, the control screen facilitates eco-driving.

## **SPECIAL FUNCTIONS**

### ■ **All-electric mode: Zero Emission Vehicle (ZEV)**

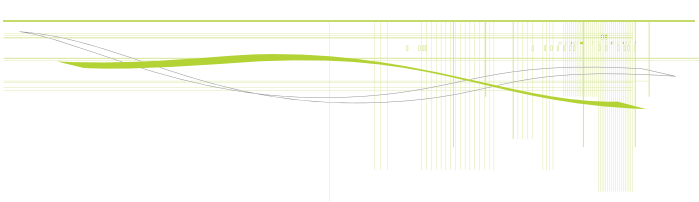
The driver can use a special switch to access an "extended" all-electric mode that expands the operating range for the vehicle in this mode. It also enhances driving comfort because it increases the vehicle's range and allows it to reach higher speeds than in the standard hybrid mode. In this case, the ICE is only activated for more prolonged acceleration. Derived from conventional electric vehicles, this function will lead to significant reduction of noise and emissions outside the vehicle, while also considerably reducing passenger compartment noise for greater acoustic comfort.

The extended all-electric mode is de-activated either automatically, when the high-voltage battery pack no longer has a sufficient charge, or manually, by using the dedicated switch.

### ■ **Sequential mode and dynamic mode**

Drivers can select the sequential mode by using the control lever on the gearbox. They can also choose a gear at any given moment to cope with situations that may arise, such as changing down to quickly overtake another vehicle.

Gear changes are therefore very fast, and the ICE is always running, except when the vehicle is at a standstill.



The “boost” function – when the electric motor kicks in along with the ICE – is always available.

Drivers can enhance the vehicle’s responsiveness by selecting this switch. Having done this, pressing on the accelerator sends the information needed for the system to deliver instant torque. At the same time, gear shifting is as fast as the system allows. In this case, gears are changed automatically, without the driver having to do anything.

#### ■ **Hybride HDi: Independent under all conditions**

Even when the high-voltage battery pack discharges, for instance following a long period without being driven, the Hybride HDi is always able to start, unlike other hybrid systems. Its Stop & Start system, connected to the diesel engine, can start from the 12V battery, with the alternator generating electrical power. This means that the vehicle is totally independent, but in a “limited” all ICE mode. After just ten minutes of driving, the time needed to initiate recharging of the high-voltage battery pack, the vehicle once again offers its full range of functions.

Likewise, should a problem occur (i.e. an electrical fault), that requires the high-voltage battery pack to be disconnected, the Hybride HDi can keep moving using the ICE on its own. This “standby” operating mode allows the driver to reach a garage safely.



## PLATFORM 2 SELECTION AND ADVANTAGES

The development of the Hybride HDi on the Peugeot 307 and the Citroën C4 platform is consistent with the Group's platform strategy.

Firstly, the Group wanted to develop this technology on vehicles in the most popular market segment in Europe – the compact segment accounted for nearly a third of all car sales in Europe in 2005.

Secondly, these vehicles offer a typical mixed use pattern, combining urban, main road and motorway driving. Under these conditions, the HDi engine was a natural choice because of its fuel efficiency, unrivalled by petrol engines.

### ■ An innovative demonstration of diesel hybrids

With the Hybride HDi on its platform 2 vehicles – the Peugeot 307 and the Citroën C4 – PSA Peugeot Citroën demonstrates its technical expertise in diesel hybrid powertrains. The Group also highlights the potential of HDi engines to deliver a genuine step change in technology that paves the way for excellent fuel economy.



### III. SEEKING A VIABLE BUSINESS MODEL

The modern diesel engine, especially the hybrid diesel, is a very appropriate solution to significantly reduce fuel consumption and CO<sub>2</sub> emissions – as proven by the exceptional performance of the Peugeot 307 and Citroën C4 Hybride HDi demonstrators.

#### THE POTENTIAL OF HYBRIDE HDi: TECHNOLOGICAL BREAKTHROUGH NEEDED TO REACH COST EFFICIENT VOLUME PRODUCTION PHASE

The economic analysis of hybrid technology carried out to date lead to three primary observations:

- **By definition, this technology will continue to be more expensive than any current ICE-based solution**

A series of components (high-voltage batteries, electric motor, inverter, power electronics, Stop & Start system, regenerative braking) are added to the price of the conventional powertrain. Hybrid technology is therefore much more expensive than the conventional configuration.

- **Economies of scale are still insufficient to lower the cost of this technology to acceptable levels**

Because of the cost of the current technology, only small volumes will be marketed. But even if volumes were to increase significantly and thereby drive down costs, the current state of the art means that costs are still incompatible with a realistic market price that would encourage widespread take-up of this offer. Major technological advances are therefore essential to be able to reduce the cost differential two or three-fold. These advances will have to focus on the four major components in the system that account for the bulk of the additional cost, namely the electric motor, the high-voltage battery pack, the inverter and the regenerative braking system.



## **SETTING UP AN HYBRID TECHNOLOGY NETWORK**

To meet this challenge, incentives need to be provided for networked research projects with companies offering R&D expertise and a production system – which has yet to be built. Research on diesel hybrid technology is still largely limited to France and Europe, given the characteristics of this market.

The deliverables defined by the French Government's Agency for Industrial Innovation (All) include a program to develop clean vehicles incorporating a step change in technologies. The objective is to develop a family saloon, at market prices, offering fuel consumption of 3.5 litres per 100 kilometres.

PSA Peugeot Citroën has offered to coordinate a project which would bring together the expertise of French and European equipment manufacturers and laboratories, based on its hybrid HDi technology.

## **SEEKING A BUSINESS MODEL LEADING TO THE ROLL-OUT OF A VEHICLE EARLY IN THE NEXT DECADE**

Unless a viable business model is developed that would limit the cost differential to a level acceptable to consumers, the hybrid will remain an elitist, little used technology, and therefore ineffective from an environmental standpoint. It would also be far from the purpose of any volume vehicle manufacturer, which by definition wants to provide the greatest number of people with “useful accessible technologies for everyone.”

PSA Peugeot Citroën believes that the level of acceptability of the cost differential for a diesel hybrid is similar to the gap between conventional petrol and diesel HDi powertrains, given the expected gains in fuel economy and new capabilities of the hybrid vehicle. In other words, the main challenge facing hybrid vehicles is not so much technological or industrial know-how, but rather achieving a selling price that matches consumers' purchasing power.

PSA Peugeot Citroën is now focusing on achieving acceptable market prices, along with the continued development of its technological expertise. The objective is to roll out the first Hybride HDi vehicles early in the next decade.



## CONCLUSION

Based on the Group's technological commitments and strategic choices, PSA Peugeot Citroën is offering a diesel hybrid solution with very real potential as part of its vehicle platform strategy.

The new Citroën C4 and Peugeot 307 Hybride HDi demonstrators have not only achieved outstanding results in terms of fuel economy (3.4 litres per 100 kilometres) and CO<sub>2</sub> emissions (90 grams per kilometre), but they retain the recognised driving comfort associated with conventional diesel HDi powered cars. At the same time, they add new improvements due to the hybrid powertrain, such as the all-electric mode at low speeds.

These encouraging results validate the Group's strategic and technological decisions from two standpoints:

- Firstly, the role of diesel engines in fostering a breakthrough in fuel efficiency for hybrid powertrains;
- Secondly, the advantage of offering this technology to the greatest number of people, by incorporating it in the vehicle families that are at the core of the European market.

Hybrid diesel vehicles are therefore a prime solution to continue paving the way for a significant reduction in fuel consumption and CO<sub>2</sub> emissions, whilst expanding the current Peugeot and Citroën ranges.

However, for the promise of the Hybride HDi solution to be fulfilled, the cost differential for this technology must be significantly reduced – the Group will now focus all efforts on meeting this goal.

## PSA PEUGEOT CITROËN'S HYBRID R&D

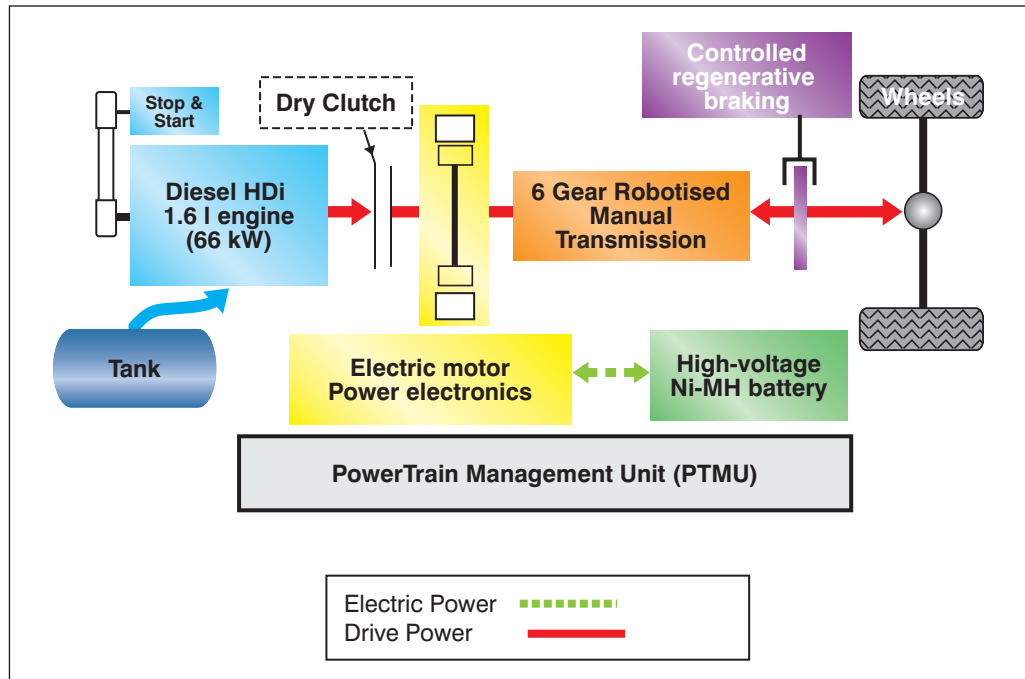
### MORE THAN A DECADE OF PROACTIVE TECHNOLOGICAL R&D

PSA Peugeot Citroën has been conducting basic and applied research on hybrid technology since the early 1990s, initially focusing on an electric vehicle/series hybrid combination, the Citroën **Berlingo Dynavolt**. Electricity from the grid, stored in the batteries, is topped up with electrical power produced by an auxiliary generator. Outside the city, the electric motor can be partly supplied by the generator, thanks to intelligent energy management.

With the Citroën **Xsara Dynalto**, the Group came up with a solution that could be series produced, delivering a 10% gain in fuel economy (for a standard combined urban/motorways cycle) and a proportional reduction in CO<sub>2</sub> emissions. The main source of gain was the Stop and Go function, which automatically started and cut the engine off in traffic jams, at traffic lights and during prolonged stops, thereby eliminating noise, especially in cities. This innovation resulted in the marketing of first the Citroën C3, then the C2 Stop & Start, the first vehicles with affordable mild hybrid technology. The Stop and Start system has reduced fuel consumption by 10% for urban driving, 6% in a standard combined cycle and up to 15% in heavy traffic.

Unveiled in February 2000, the Citroën **Xsara Dynactive** explored parallel hybrid technology. Designed with a 55 kW (34 hp) petrol ICE and a 25 kW electric motor, it featured an automatic gearbox. The innovative architecture leveraged the gearbox to give the Citroën Xsara Dynactive a highly efficient ZEV mode in urban driving (some 20 kilometre range).

## HYBRID PARALLEL ARCHITECTURE OF THE CITROËN C4 AND THE PEUGEOT 307 HYBRIDE HDi



## TECHNICAL SPECIFICATIONS OF HYBRIDE HDi

### VEHICLE

Platform 2	Citroën C4 & Peugeot 307 Hybride HDi
Kerb weight	1,390 kg
Mass for Hybrid Drive	110 kg
Tank	60 litres
Brakes	Conventional hydraulic braking system and regeneration with electrical motor. Electronically controlled regenerative braking system.

### ENGINE

Type: 1.6 litre Diesel, front position.  
4 cylinders in line, aluminium cylinder head and block.  
Common rail direct injection, turbocharged and intercooler  
Power: 66 kW at 4,000 rpm - Torque: 215 Nm at 1,750 rpm  
Stop & Start system to start the engine.

### MOTOR / GENERATOR

Type: Permanent Magnet Synchronous Motor  
16 kW (22 Ch.) of continuous power, torque: 80 Nm  
23 kW (32 Ch) peak power, 130 Nm maximum torque

### INVERTER

Voltage range at full performances: 210 to 380 Volts; liquid cooled.

### HIGH-VOLTAGE BATTERY PACK

Type	Nickel-metal hydride.
Nominal voltage	288 Volts.
Capacity	6.5 Ah
Electrical range	5 km

### CONVERTER

To convert high voltage to 12 Volts for onboard network, during electrical running mode alone.  
3 independent modules of 500 W each.

### GEAR BOX

Type	Robotised Manual Transmission
6 gears	

### VEHICLE MANAGEMENT

PowerTrain Management Unit: Select the appropriate propulsion mode (electric motor, ICE, or both) to optimise fuel economy.

## HYBRIDE HDi: PERFORMANCES AND FUEL CONSUMPTION

VEHICLE	CONVENTIONAL C4/307	HYBRIDE HDi
<b>Engine</b>	Diesel 1.6 litres (80 kW)	Diesel 1.6 litres (66 kW)
<b>Transmission type</b>	Manual 5 gears	Robotised 6 gears
<b>Speed max (km/h)</b>	192	181
From stop to 100 km/h	12.4"	12.4"
From stop to 400 m	18.5"	18.4"
From stop to 1,000 m	33.7"	33.9"
KD: 30 to 60 km/h	5.8"	3.5"
KD: 80 to 120 km/h	13.0"	10.6"
<b>NEDC Cycle Std CEE 1999-100</b>		
Fuel consumption (l/100km)	4.7	<b>3.4</b>
CO <sub>2</sub> emission (g/km)	125	<b>90</b>
<b>Fuel savings vs HDi in %</b>	-	<b>-28%</b>
<b>Urban Cycle</b>		
Fuel consumption (l/100km)	5.4	<b>3.0</b>
CO <sub>2</sub> emission (g/km)	145	<b>80</b>
<b>Fuel savings vs HDi in %</b>	-	<b>-45%</b>