

Yaris Hybrid

Environmental Declaration



TOYOTA

ALWAYS A
BETTER WAY





Since its launch in 1999, Yaris has been carving out a new age of compact vehicles.

Its key features include; a high efficiency package offering, comfortable interior space and a compact exterior appearance. In addition to this, the Yaris engine and the engine unit combined give this vehicle an agile feel with superior fuel consumption.

With growing environmental awareness and associated car ownership taxation systems, the intensification of competition within the compact vehicle class has risen sharply in recent years – particularly during a prolonged recession. Under these severe circumstances, we have developed Yaris Hybrid as an advanced and environmentally friendly vehicle that is based on Yaris' renowned DNA.

This newly developed compact-sized hybrid, with advanced outline, already boasts class-leading fuel efficiency. This is another example of our commitment to protecting our global environment and we will continue to make further progress in the future.

Hirofumi Yamamoto
Chief Engineer, Yaris Hybrid
Toyota Motor Corporation



Following the launch of the Auris Hybrid, the Yaris Hybrid is Toyota's second core model to feature HSD technology and brings this remarkable powertrain to the biggest volume segment in Europe.

Combining class-leading emissions with 79g CO₂, low fuel consumption and cost of ownership with uniquely relaxed and quiet driving, Yaris Hybrid is another example of Toyota's excellence in offering class-leading sustainable mobility solutions.

Yaris Hybrid is designed to appeal to a broad range of customers through several technological breakthroughs such as a downsized hybrid powertrain, a distinctive and refined design, and segment-leading CO₂ emissions.

In addition, Yaris Hybrid offers the most affordable full hybrid ever in the European market. Leading the way, Yaris Hybrid is the result of our commitment to bring sustainable technologies to the mass market.

Daniele Schillaci
Senior Vice President, Sales & Marketing
Toyota Motor Europe



At Toyota Motor Manufacturing France, we have been committed to reducing the environmental impact of all our operations since we started in 2001. In 2007 we were nominated as a sustainable plant by Toyota Motor Corporation, due to our good results and commitment.

We are very proud to integrate hybrid technology with the launch of the Yaris Hybrid, the first full hybrid B segment vehicle to be produced in Europe.

The level of our environmental performance is in constant progress as we aim to become an exemplary eco plant. The hybrid technology clearly reinforces our commitment to clean cars and manufacturing with low environmental impact.

Makoto Sano
President
Toyota Motor Manufacturing France

Scope. How is the environmental impact of Yaris Hybrid measured and improved? This document follows the complete Life Cycle Thinking for Yaris Hybrid, using the Life Cycle Assessment tool and employing ISO 14040-series methodology throughout.

Life Cycle Thinking is a process which takes into account all resources consumed and the environmental/health pressures associated with the whole life cycle of a product; 360° approach from design through production, driving and finally recycling.

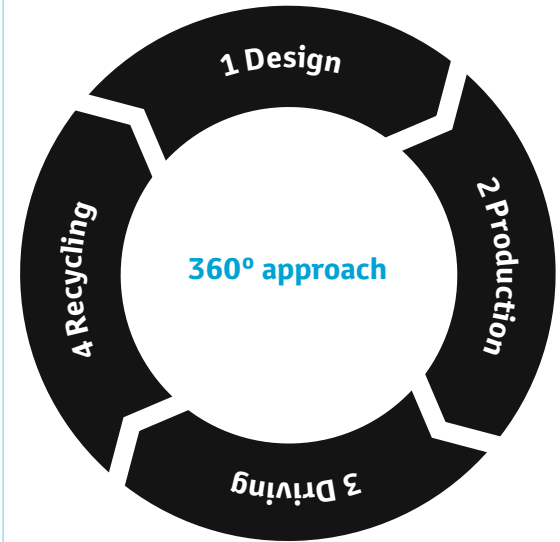
Life Cycle Assessment (LCA) is the methodology used to support Life Cycle Thinking: first by quantifying the data, and secondly by assessing the environmental/health impacts of a product through its whole life cycle, in order to identify environmental benefits and potential areas for improvement.

In other words, the objective is to discover how much we have improved the new generation product in comparison to the previous one. We then ensure that all the findings are integrated into new product design and development.

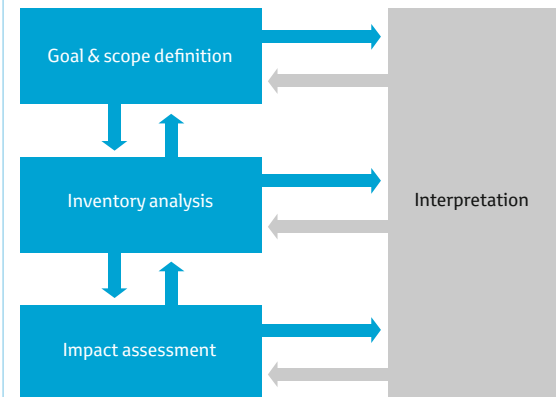
ISO 14040-series methodology

An International Organisation for Standardisation guideline that describes the principles and framework for Life Cycle Assessment of a vehicle's overall environmental impact.

Life Cycle Thinking



Life Cycle Assessment framework



1. Design. What role does design play in the environmental performance of Yaris Hybrid? The findings from our Life Cycle Assessment process are applied at the design development stage. Every design detail is analysed to ensure the lowest possible environmental impact throughout the vehicle's lifespan. This meticulous approach to design has led to an array of innovative features that each contribute to environmental efficiency. These include lightweight design and the conservation of resources, like the application of recyclable plastics (TSOP) and the use of recycled material.

Conservation of resources

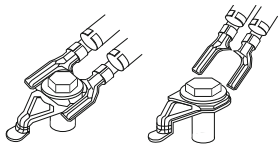
Easy-to-dismantle mark

In order to simplify the dismantling process, Toyota designed an easy-to-dismantle mark. This mark is added to vehicle parts clearly indicating certain points that assist in initial dismantling, such as the positions at which large resin parts can be easily separated and the locations at which holes can be drilled for removing fuel.



Easy-to-dismantle vehicle structure

A structure has been designed that allows the wire harness to come apart like a pull-tab at the grounding terminal when the wire harness is pulled hard for removal. This structure allows dismantlers to recuperate the wire harness easily, facilitating the recycling of the materials applied.



Recyclable plastics (TSOP)

We recycle as many parts of our vehicles as possible. Our own specially developed recyclable plastic called Toyota Super Olefin Polymer is a thermoplastic resin which has better recyclability than any conventional reinforced composite polypropylene.

TSOP is created using our groundbreaking molecular design technology based on new and innovative crystallisation theory.

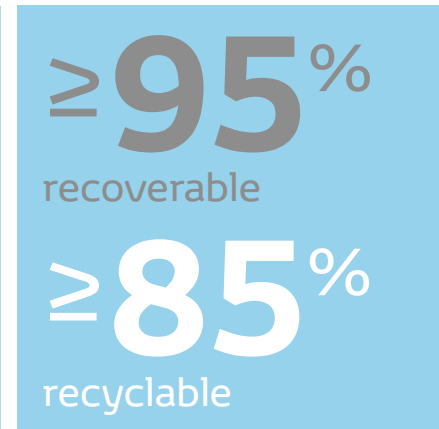
Recycled material

In a market where the price of raw materials is increasing constantly, Toyota, in cooperation with its suppliers, integrated 6.4 kg of recycled plastic materials, including sound-proofing products.

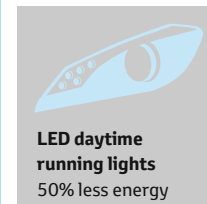
Lightweight and compact

As Yaris Hybrid includes many additional safety devices, lightweight design was applied in order to reduce the overall vehicle body weight. 90%* of the full hybrid drive components have been redesigned to create a 17%* lighter, more compact system. This results in better fuel consumption.

* Compared to the current Prius.



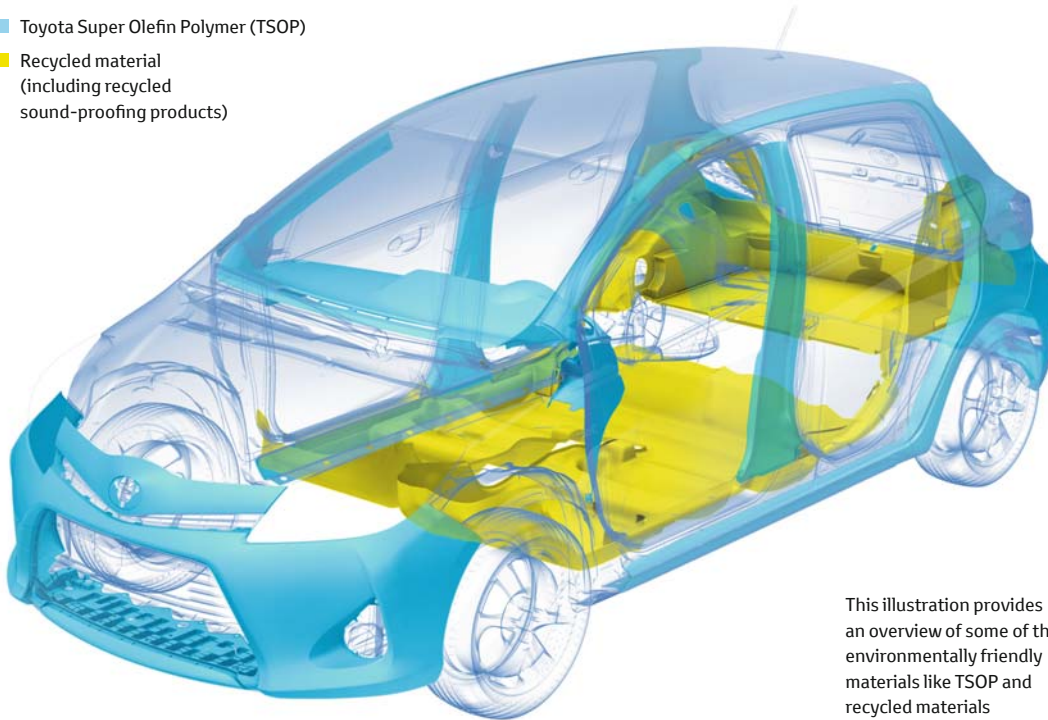
Energy-saving technology at the use phase



LED daytime running lights
50% less energy

Conservation of resources

- Toyota Super Olefin Polymer (TSOP)
- Recycled material (including recycled sound-proofing products)



This illustration provides an overview of some of the environmentally friendly materials like TSOP and recycled materials used in the construction of Yaris Hybrid.

Material composition

Based on vehicle weight.

	Yaris petrol	Yaris diesel	Yaris Hybrid
Steel & iron	63%	63%	64%
Light alloys (aluminium, magnesium, ...)	9%	10%	9%
Non-ferrous (excl. aluminium, magnesium, ...)	3%	3%	4%
Polymers	16%	15%	15%

Aluminium features include cylinder block, transaxle, cylinder head, oil pan, compressor, cylinder head cover, converter case, inverter case, rear disc brake caliper, oil pump, brake master cylinder, steering link.

2. Vehicle production. How is environmental efficiency ensured during production? Toyota Motor Manufacturing France (TMMF) started its production activity in 2001. The plant was built following the Green, Clean and Lean concept. This allows TMMF to optimise energy consumption concerning heating and logistics. Since the start of production, TMMF always considered the environment as a main priority, the plant obtained ISO 14001 certification in 2002. TMMF sent 0 waste to landfill since the beginning of its activity and achieved 0 incineration from 2007, becoming the first company in the North of France to do so.

TMMF has been chosen by Toyota Motor Corporation (TMC) as a sustainable plant since 2007 due to its environmental performances.

TMMF continuously improves its performances by aiming to reduce its consumptions, using more efficient energy sources and implementing innovative technologies such as renewable energy:

- in 2009, TMMF installed 1020m² of solar membrane on the logistic building roof which provides 6 months worth of office electricity consumption,
- a 400m² solar wall was installed at the Press Shop in 2010 and it reduces gas consumption for heating the building by preheating fresh air from the outside,
- a rainwater recovery basin (6000m³) collects rainwater from the yard and saves 36% on the plant's regular water usage. A second recovery basin will allow TMMF to double its rainwater usage.

TMMF plant



Solar wall (400m²)



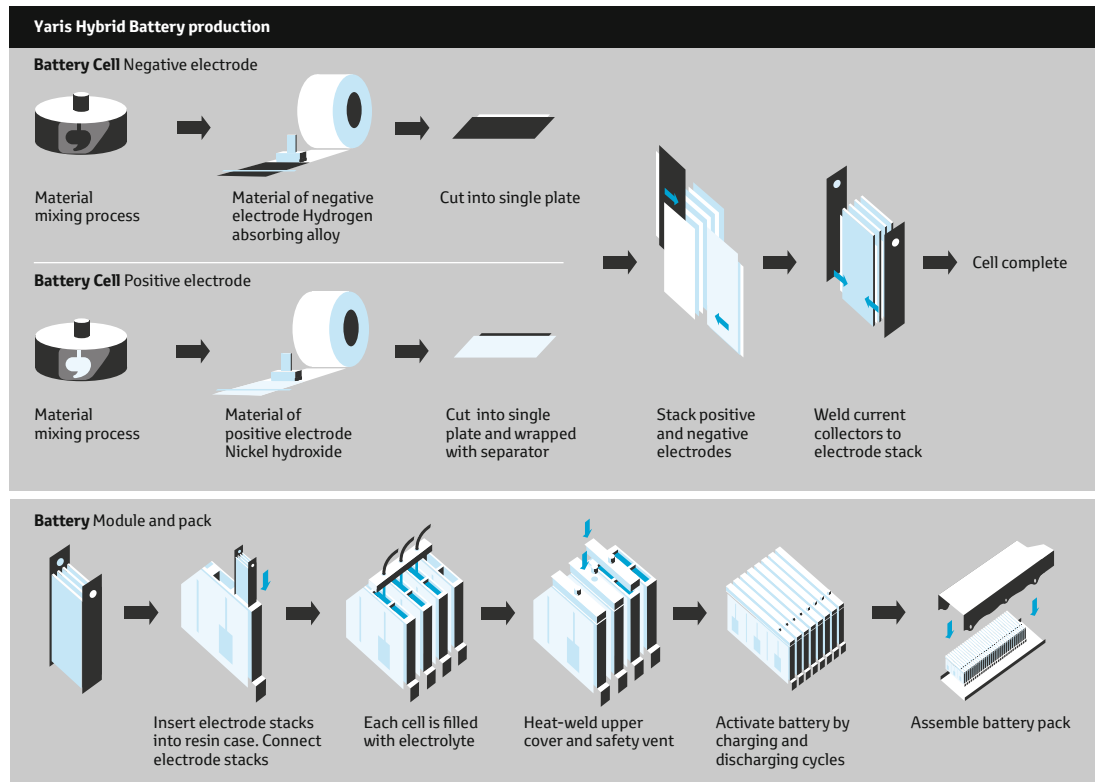
Eco factory efficiency
TMMF plant

	2002–2011 (reduction percentages per vehicle produced)
Energy usage reduction	27%
Waste reduction	34%
Purchased water reduction	67%
Volatile organic compound reduction	48%

Environmental Management System ISO 14001

Specifies the actual requirements for an environmental management system.

Hybrid battery production. Is the battery produced in a sustainable way?
Yes! The battery is built in a state-of-the-art plant in Japan, by Panasonic EV Energy Co (PEVE). The battery plant operates according to the Quality Management System ISO/TS16949 and the Environmental Management System ISO 14001.



Panasonic EV Energy Co (PEVE)

- PEVE is a joint-venture company established by Toyota Motor Corporation
- TMC (60%) and Panasonic Corporation (40%)

Yaris Hybrid battery specifications
 NiMH

Nickel-metal hydride	
	144 V
	19.3 kW
	20 modules per battery pack
	6 cells per module
	25 plates per cell

Yaris Hybrid

Research

Toyota Motor Corporation Battery Research Department is jointly researching materials for next-generation batteries with the Japanese National Institute for Materials Science (NIMS).

3. Driving. How does Life Cycle Assessment help create the world's most environmentally friendly drive? Hybrid Synergy Drive®, lightweight compact components and refined aerodynamics have all been developed to provide groundbreaking environmental performance. The Hybrid System Indicator and Eco-driving Indicator help you to maximise the efficiency of your drive.

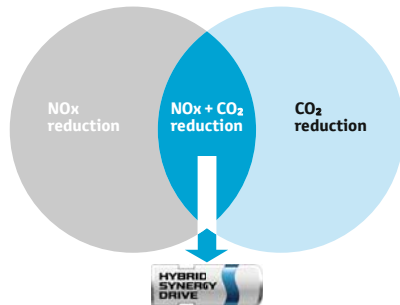
Hybrid Synergy Drive®

The petrol engine and two electric motors are all separate, which allows Yaris Hybrid to consistently deliver maximum performance and efficiency at every stage of your drive. It also means that you can drive solely on electric power – so no fuel consumption or emissions. Other hybrid vehicles cannot do this, consuming unnecessary fuel in every driving situation. Uniquely, the second electric motor can independently recharge the battery at any time.

A powerful and efficient 1.8 litre engine helps to minimise fuel consumption. The compact lightweight design reduces overall vehicle weight for leaner and fitter performance.

Toyota full hybrid technology

Hybrid Synergy Drive® significantly reduces NOx and CO₂ emissions while also improving fuel economy. At present, there are no clean diesels that can offer all three benefits to the same extent as Toyota's full hybrid vehicles. The NOx emissions of the new Yaris Hybrid of 6 mg/km* are far lower than the Euro 6 NOx petrol limit level of 60 mg/km.



Eco-driving Indicator

You can play your part too. Drive your Yaris Hybrid in the right way and reduce CO₂ emissions by around 20–30%.

As a supportive tool Yaris Hybrid gives you a chance to monitor and hone your eco driving skills, with the:

— Energy flow display

Displays the current operating conditions of the engine and the flow of the electric power. It allows drivers to understand the basic energy flow of the full hybrid system.

— Hybrid System Indicator

Displays information as a guide to support enjoyable eco driving. The bar instantly reflects accelerator operations and allows the driver to visually confirm their pedal operations.

— EV Mode

Select EV mode for electric-only driving that delivers outstanding efficiency, zero emissions and a quiet driving experience.

Energy flow display



Hybrid System Indicator



Driving efficiency

	Yaris petrol	Yaris diesel	Yaris Hybrid
Fuel consumption			
l/100 km	5.0	4.0	3.5
CO₂ level g/km	114	105	79
Air quality	Euro 5	Euro 5	Euro 5
Drag coefficient C_d	0.287	0.287	0.286

Note: Fuel consumption and CO₂ level figures represent respective combined performance. All data based on Active grade vehicle with 15" wheels.

* Measured on EU homologation test cycle.

4. Recycling. How is the recycling process maximised? Toyota thinks it is vital to take a more proactive approach to recycling, geared towards the creation of a sustainable and recycling-orientated society. On the basis of such thinking Toyota adopted the Toyota Recycling Vision, which sets forth long-term goals for recycling end-of-life vehicles. And Toyota is proceeding to recycle end-of-life vehicles and components as well as implementing easy-to-recycle design.

Complete vehicle recycling

EU Directive 2000/53/EC indicates that as of 1 January 2006, 85% of the car by weight should be re-used or recovered. By 2015 this percentage will rise to as high as 95%, of which only 10% can be used for thermal recovery. Toyota is committed to achieving these stringent recycling/recovery targets through an intense collaboration with all the partners in the treatment chain.

Hybrid battery recycling

EU Directive 2006/66/EEC was adopted in 2006 and enforced in EU Member States in 2008. The Final Treatment Company meets the legally required recycling target of an average weight of 50% for industrial batteries, such as the NiMH battery used in Yaris Hybrid.

As Toyota is highly concerned about the environment we believe there is a solid business case for recycling Hybrid Batteries:

- Conservation of virgin materials
- Decrease in energy consumption
- Reduction of greenhouse emissions
- Minimisation of hazardous materials disposed of in nature

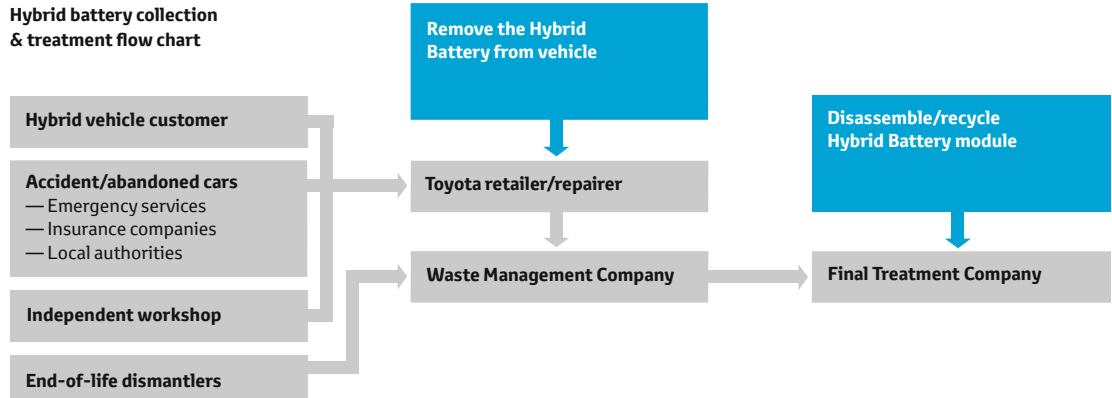
Special metals used, such as nickel (Ni) and cobalt (Co)

According to the World Nickel Institute, about 60–65% of global Ni production is used for the making of stainless steel. Another large portion goes into engine alloys such as pistons and rings. About 2.5% of Ni goes into the production of all types of batteries, mainly portable rechargeable battery devices, such as mobile phones and laptop PCs.

Batteries represent a secondary ore with high valuable metal content. Its steel, copper (Cu), Ni and Co is recycled, sold back into the market and re-used for different types of applications, such as the production of stainless steel. Established pathways exist for collection, disassembly, sorting and recycling of these metals – this is similar to the recycling flow of catalytic converters.

According to EU Commission information, using recycled Ni requires 75% less primary energy than the extraction and refining of virgin materials.

Hybrid battery collection & treatment flow chart



Life Cycle Assessment. How has Life Cycle Assessment influenced the evolution of Yaris Hybrid? Toyota have made a big effort to improve CO₂ emissions from design, through production, driving and recycling. Yaris Hybrid improves fuel economy without compromising on performance.

Boundary conditions and assumptions

- From production, to driving, to recycling (including mining and transportation)
- Assumed driving distance 150,000 km (New EU Drive Cycle – NEDC)

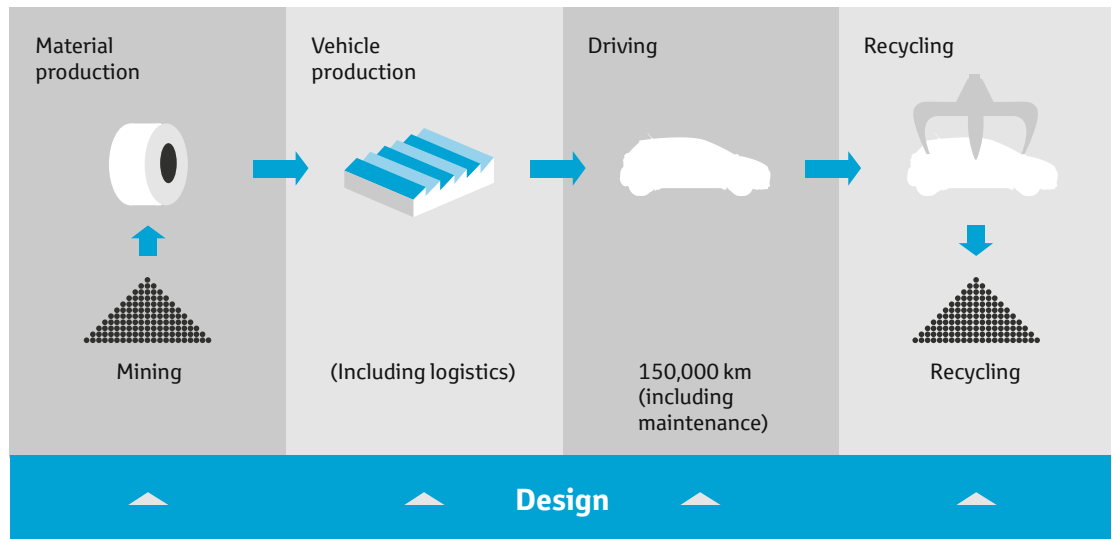
Boundary conditions

TMMF

	Petrol	Diesel	Hybrid
Fuel type	Petrol	Diesel	Hybrid
Engine type	INR	IND	INZ
Transmission type	Multidrive S	MultiMode	e-CVT
Vehicle weight (kerb weight minimum)	1015 kg	1050 kg	1085 kg
Fuel consumption	5.0 l/100 km	4.0 l/100 km	3.5 l/100 km
Production plant	TMMF	TMMF	TMMF

e-CVT = electronically controlled Continuously Variable Transmission

Note: All data based on Active grade vehicle with 15" wheels.

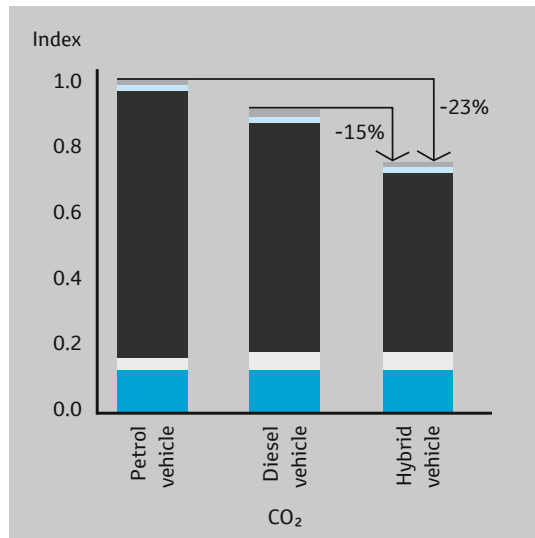


Design takes into account the reduction of environmental impact for each phase.

An eco car, made in an eco factory, built by people who have eco on their mind.

- Full hybrid
- A big contributor to the reduction of emissions throughout the complete vehicle life cycle
- High air quality standards: Euro 5 – hardly any NOx and PM emissions (better than Euro 6 petrol requirements as presently [May 2010] known)
- CO₂ levels: 79 g/km
- Use of recycled plastic material
- ≥ 95% recoverability and ≥ 85% recyclability

CO₂ emissions per km

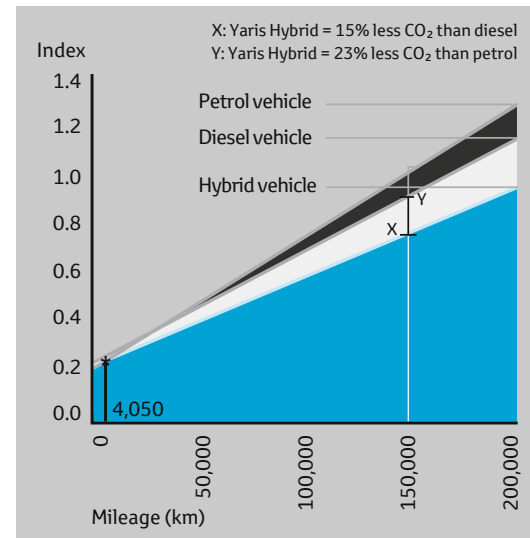


■ Disposal ■ Maintenance ■ Driving
■ Vehicle production ■ Material production

Conclusions:

- The CO₂ emissions of Yaris Hybrid are 23% less than the Yaris petrol.
- The CO₂ emissions of Yaris Hybrid are 15% less than the Yaris diesel.
- The CO₂ emissions of Yaris Hybrid related to the production phase are similar.
- The driving phase of conventional engine types accounts for more than 75% of the life cycle CO₂ emissions.

Ratio between kilometres and CO₂



Note: Comparable petrol vehicle with 150,000 km = index 1.0.

*Represents 'petrol vehicle index' = 'hybrid vehicle index' (4,050 km).
'Hybrid vehicle index' is smaller than 'diesel vehicle index' regardless of the mileage.

Sensitivity analysis

As some people drive more than or less than 150,000 km, we study the ratio between mileage and CO₂. Material and vehicle production of Yaris Hybrid is similar to that of the Yaris petrol and diesel vehicles. By driving 150,000 km the CO₂ reduction varies between 15 to 23%. If your mileage is higher, the relative CO₂ emission savings will be even greater.



Point your smartphone or webcam at the graphic and start a new experience of Yaris.

To learn more about Toyota and the environment please visit our website **toyota-europe.com**



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