

Plug-in hybrid vehicle demonstration in Strasbourg



Final conclusions of the
three-year demonstration -
April 2013



TOYOTA



Avec le soutien
de l'ADEME



Rigorous monitoring of vehicles, recharging and driving profiles



- Toyota equipped all plug-in hybrid vehicles with monitoring devices and one third of them with data loggers measuring accurately vehicle performance and driving profile.
- French energy provider EDF and Toyota carried out driver surveys.
- EDF and its subsidiary SODETREL monitored the charging stations, checking and maintaining both the private and public stations.

A full-scale, three-year demonstration in sustainable mobility, carried out in Strasbourg

INVOLVING 33 partners
70 plug-in hybrids
112 charging stations
145 charging points

THE END RESULT - CONSISTENT BEHAVIOUR OVER THE THREE YEARS

- More than 4 million kilometers traveled
- Average recorded annual mileage of more than 19,000 km
- An average of 1.1 recharges per day
- 75 minutes average recharge time
- Drivers spend one third of their time driving in all-electric mode
- A 46% reduction in gasoline consumption compared with equivalent conventional vehicles

More effective recharging systems

Recharging soon became a reflex, with drivers recharging mainly at work (60%) and at home (37%).

- Built-in devices in the rechargers delayed recharging and were automatically programmed to recharge overnight, thus reducing the cost by benefiting from preferential electricity rates.
- EDF developed a dedicated website in order to display charging energy consumption, confirming that the average cost of a recharge was only €0.30 inclusive of taxes.
- Drivers recharged with greater regularity and ease once they knew the cost of a recharge.



What developments were there in Strasbourg?



As part of expanding the demonstration to new drivers, the network of public recharging stations was enhanced with 8 stations that were interoperable and accessible to all electric and plug-in hybrid vehicles.

The Urban Community of Strasbourg kept in step with the increased use of electric and plug-in hybrid vehicles by developing a recharging infrastructure. The community thus benefits from feedback which it can use to strengthen its public recharging infrastructure.



Assessment

Drivers recharge mostly at work (60%) and at home (37%).

Nevertheless, public recharging stations on roads or in public car parks are essential: they reduce drivers' worries and provide additional recharging facilities for everyone's benefit.

Dissemination of information on the location and availability of recharging stations is available via smartphones. Drivers are particularly appreciative of this service.

The stations demonstrate daily that recharging electric vehicles using a public recharging infrastructure is possible.



Slowly the electric vehicle is finding its place in the urban landscape; drivers of conventional vehicles now respect the spaces reserved for recharging.

Near-term prospects

Electric mobility is a growing trend, new electric and plug-in hybrid vehicles are being marketed in France and Germany. Half of the public recharging stations installed at the beginning of the demonstration have been, or will be, modified.

Since February 2013, new "accelerated" recharging stations have been installed in Strasbourg.

The Urban Community of Strasbourg is committed to the deployment of cross-border stations as part of the CROME (Cross-Border Mobility for Electric Vehicles) program. It lies at the heart of a network of accelerated and rapid charging stations that connects Moselle to Baden Württemberg and passes through Alsace.

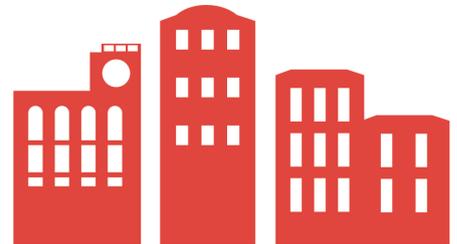
The demonstration shows that electric mobility is gradually becoming firmly embedded in normal day-to-day conditions.





The demonstration contributed to the final product

The data collected during the three-year demonstration in Strasbourg have confirmed the effectiveness of the plug-in hybrid technology in reducing fuel consumption: a 46% reduction compared to an equivalent conventional gasoline-powered vehicle.



Thanks to the exhaustive data collected and extensive user feedback from the drivers in Strasbourg, Toyota was able to develop the production model of the Prius Plug-in with an increased all-electric range of 25 km. This choice not only provides the best compromise between mileage, performance, footprint, weight in relation to the price of the car, but it also covers the daily transport needs of 80% of Europeans.

By February 2013, the 2012 production model had sold more than 31,000 units worldwide.

This number is 1.5 times greater than the annual worldwide sales of the first Prius in the year 2000.

Considered as the basis for the next generation of environmentally-friendly vehicles, Toyota is developing the plug-in hybrid vehicle to make it more accessible to the public at large, at an affordable price and with easier recharging.

The Prius Plug-in is thus the first model in a range of plug-in hybrid vehicles for the future.



Recharging a plug-in hybrid: a daily routine

Drivers recharge their plug-in hybrids as part of their daily routine, ensuring they recharge them as much as possible so as to enjoy their all-electric range. It's a habit they build up over time as they gradually get used to their vehicles.



Recharging becomes a daily, commonplace activity.

When they leave their workplace, users drive mainly in all-electric mode.

At home, once they know the exact costs (thanks to EDF's suggested consumption tracking) drivers recharge regularly and prefer to leave the cable connected to the recharging point, ready to charge their vehicle.

Away from home, drivers recharge when they can and at a convenient recharging station, depending on the next trip they have to make. These public stations offer additional recharging possibilities and are much welcomed by drivers.



Green' Up
recharger
LEGRAND



Witty
recharger
HAGER



Evlink recharger
SCHNEIDER



Green'Up
Access socket
LEGRAND



The advantages of regular recharging



Toyota equipped a third of its plug-in hybrids with data loggers to monitor these vehicles' performance in relation to their journeys. This has yielded the following conclusions:

Relationship between fuel consumption and recharge frequency

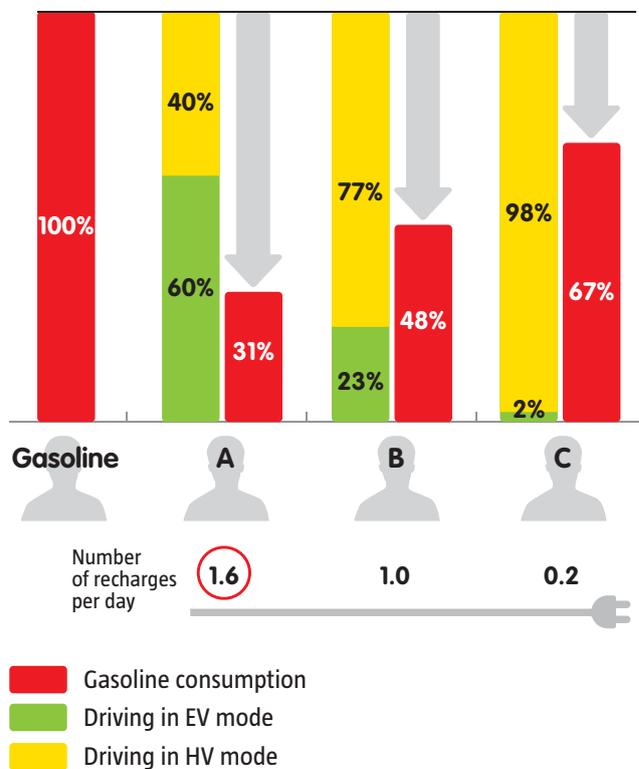
Plug-in hybrids that are recharged most frequently spend a higher proportion of their time in all-electric drive mode and consume less fuel.

Compared to an equivalent gasoline-powered vehicle, the reduction in fuel consumption of a plug-in hybrid vehicle recorded during the demonstration was:

- about 69% for Driver A who recharges 1.6 times a day and drives in all-electric mode for 60% of the time.
- about 52% for Driver B who recharges once a day and drives in all-electric mode for 23% of the time.
- about 33% for Driver C who rarely recharges (once every 5 days) and practically always drives in hybrid mode.



COMPARATIVE FUEL CONSUMPTION FOR DIFFERENT RECHARGING BEHAVIOURS



Savings achieved on annual running costs

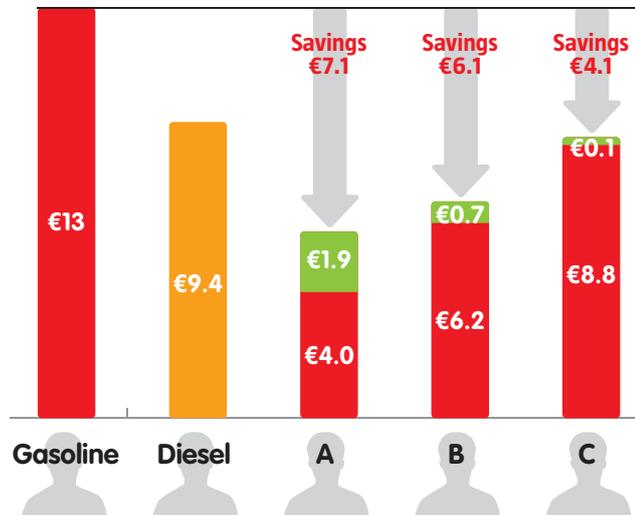
The per-mile running cost of a plug-in hybrid decreases the more regularly it is recharged.

Compared with a gasoline-powered vehicle of similar performance and an average annual mileage of about 20,000 km, during the demonstration:

- Driver A who recharges 1.6 times a day saves up to €1,400 in a year.
- Driver B who recharges once a day saves up to €1,200 in a year.
- Driver C who recharges once every 5 days can benefit from savings of up to €800 a year.

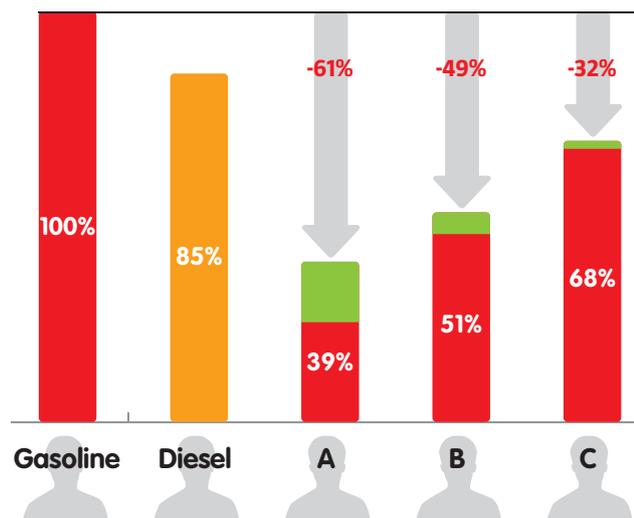
COMPARATIVE ANNUAL RUNNING COSTS FOR FUEL AND ELECTRICITY FOR 100 KM

Cost (€/100 km)



Price assumptions:
 Gasoline: €1.64/L
 Diesel: €1.49/L
 Electricity: €0.12/kWh

WELL-TO-WHEEL CO₂ EMISSIONS OF FUEL AND ELECTRICITY FOR DIFFERENT PROFILES



Impact on the reduction of CO₂ emissions

The more the plug-in hybrid is driven in all-electric mode, the greater is the reduction in its measured CO₂ emissions.

Compared to the CO₂ emissions of a gasoline-powered vehicle of similar size, a plug-in hybrid vehicle can achieve a reduction in the order of:

- 61% for Driver A who recharges his vehicle 1.6 times a day.
- 49% for Driver B who recharges his vehicle once a day.
- 32% for Driver C who drives almost all the time in hybrid mode.

The CO₂ emissions of a plug-in hybrid vehicle are some 20% to 54% lower than those of a diesel vehicle of similar performance.



Useful contacts



Sodetrel - EDF Group

Immeuble Le Colisée
10, avenue de l'Arche
92419 Courbevoie Cedex - France
Contact: Capucine Samé
Tel.: +33 (0)1 58 86 71 92
Fax: +33 (0)1 58 86 72 00
infrastructures@sodetrel.fr

Toyota Motor Europe

Avenue du Bourget 60
B- 1160 Bruxelles - Belgique
Press Contact: Jean-Yves Jault
Tel.: +32 2 745 31 74
Fax: +32 2 745 20 98
jean.yves.jault@toyota-europe.com

Toyota France

20, boulevard de la République
92423 Vaucresson Cedex - France
Press Contact: Philippe Boursereau
Tel.: +33 (0)1 47 10 81 08
philippe.boursereau@toyota-europe.com

ARS Toyota car dealer in Strasbourg

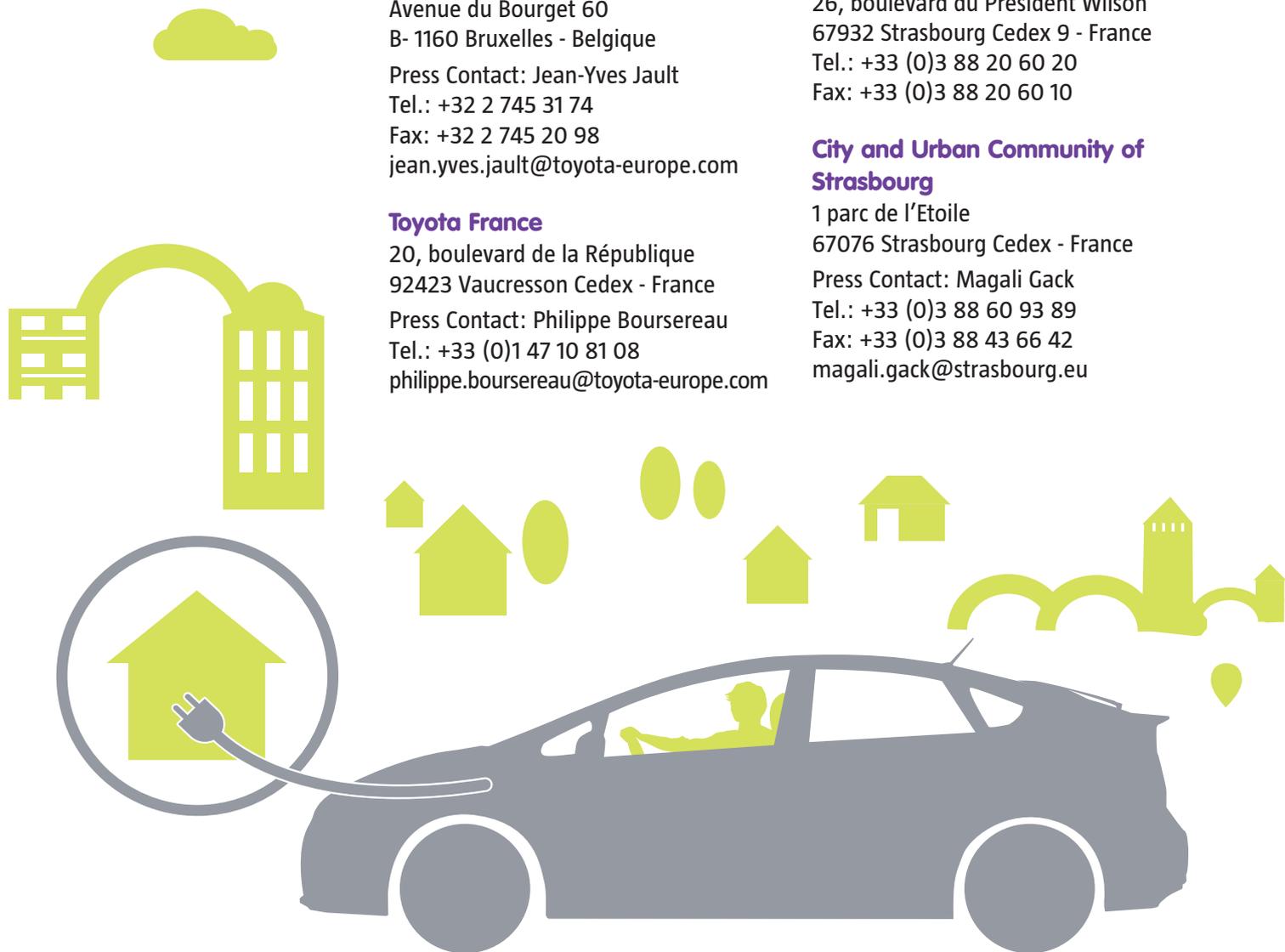
6, rue Emile Mathis
67800 Hoenheim - France
Tel.: +33 (0)3 90 20 39 40
Fax: +33 (0)3 90 20 33 47
a.r.s.hoenheim@ctoyota.net

ÉS Group

Immeuble L'Avancée
26, boulevard du Président Wilson
67932 Strasbourg Cedex 9 - France
Tel.: +33 (0)3 88 20 60 20
Fax: +33 (0)3 88 20 60 10

City and Urban Community of Strasbourg

1 parc de l'Etoile
67076 Strasbourg Cedex - France
Press Contact: Magali Gack
Tel.: +33 (0)3 88 60 93 89
Fax: +33 (0)3 88 43 66 42
magali.gack@strasbourg.eu



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