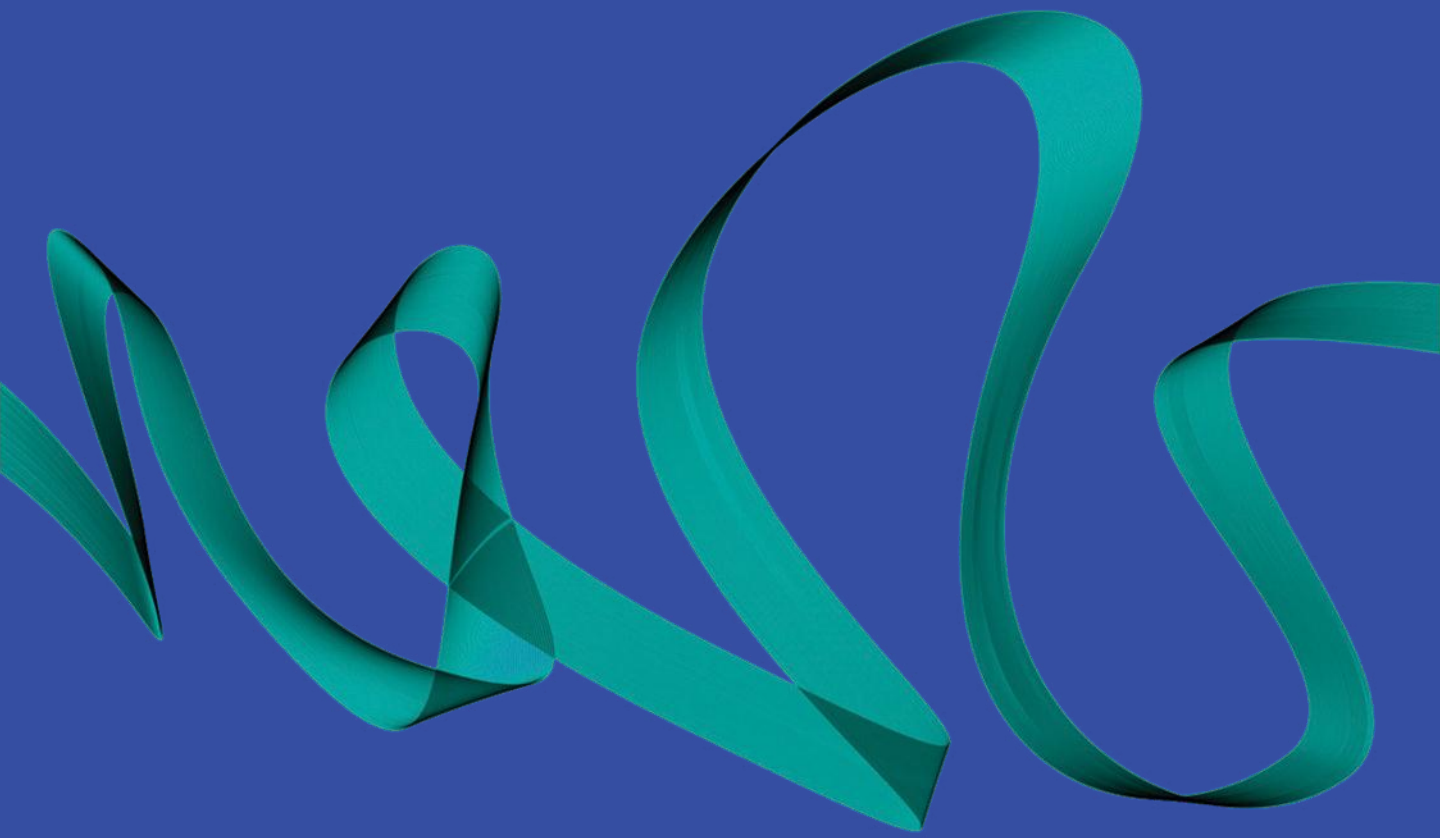
Eco Cars And Key Developments Within The Global Auto Industry



Ipsos Business Consulting

Build · Compete · Grow

contents

Overview	3
Emerging markets drive global sales growth	3
Eco cars: Diversification of power sources	4
Electric vehicles	4
Fuel cell electric vehicles	4
Eco cars: Diversification of power sources	5
Hybrid	5
Eco cars: Improving internal combustion engines	6
Conventional vehicles	6
Flexible fuel vehicles	6
Smart cars: Autonomous driving technology	6
Standardising parts	7
Partnerships and alliances	7

CONTACT US

Shu Tobita
Business Development Manager, Japan
shu.tobita@ipsos.com

Shoko Furukawa
Associate Director, Japan
shoko.furukawa@ipsos.com

AUTOMOTIVE RESEARCH AND CONSULTING FROM IPSOS BUSINESS CONSULTING

A leader in fact-based consulting, Ipsos Business Consulting is trusted by top businesses, government sectors and institutions worldwide. We support domestic and international businesses in the automotive arena using our fact-based analysis, as they endeavour to Build, Compete and Grow in emerging and developed markets globally.

Having opened our first office in 1994 in Hong Kong, Ipsos Business Consulting is immensely proud of its unique Asian heritage. Over the years we have steadily expanded across the Asia Pacific into Europe and the US, and recently opened our first office in Africa. We have grown from being an Asia-Pacific market intelligence company into being an integral part of Ipsos' global network, with a presence in 85 countries around the globe. Our automotive practice can also trace its roots back to the 1990s when we quickly established ourselves as a leading provider of research and consulting services to automotive clients operating around the Asia-Pacific. Today our service range covers auto OEM, construction vehicle OEM, vehicle parts and other related industries such as lubricants and paints and coatings.

Ipsos Business Consulting continues to support clients doing business in the automotive industries by providing practical advice based firmly in the realities of the market place. With more than two decades experience in the automotive market we offer clients the best geographical coverage and solid experience across the region.

For more information, contact automotive.bc@ipsos.com

February 2014

www.ipsosconsulting.com

Overview

Major automotive manufacturers have traditionally focused on developing high quality sophisticated vehicles for developed markets, which are reaching saturation point.

More recently, demand has increased in developed markets for so-called “eco cars” such as hi-tech hybrids and electric vehicles (EV). New technologies and demographic issues, such as an increasingly aging society, are inspiring the development of the next generation smart cars which will feature autonomous driving.

Perhaps a more significant shift is growing demand from emerging markets, which now account for a higher percentage of vehicle sales than developed markets and have become the growth engine for the global automotive industry. Even though emerging market consumers tend to favour low-price vehicles, in China and some parts of Southeast Asia, governments are introducing incentives for automakers to produce eco cars. This will likely stimulate higher demand for eco cars in those markets.

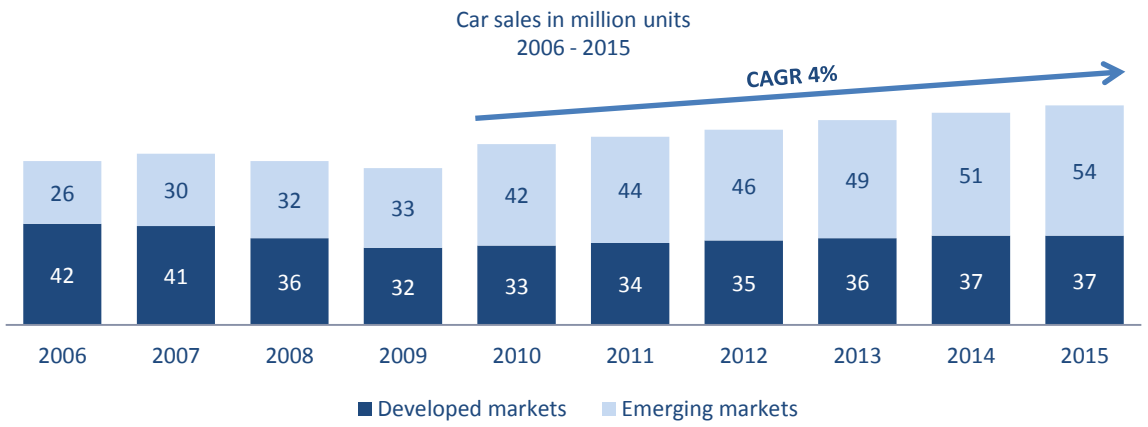
As a result, carmakers are responding to these contrasting needs and implementing new manufacturing processes to address them profitably.

Emerging markets drive global sales growth

World vehicle sales plummeted during 2008 and 2009 as a result of the global financial crisis and only started to recover in 2010. In 2009, however, the number of vehicles sold in emerging markets for the first time exceeded the number of vehicles sold in developed markets.

Since then emerging markets have remained the key driver of global auto sales growth. That trend is expected to continue with emerging market sales forecast to reach some two thirds of the total of forecast sales 90 million vehicles expected to be reached within 2015.

Figure 1: Car sales by unit in emerging and developed markets (2006 - 15)



Sources: International Organization of Motor Vehicle Manufacturers (OICA) 2006-12; Ipsos Business Consulting forecasts 2013-15

Eco cars: Diversification of power sources

Environmental concerns are forcing governments to introduce increasingly stringent emissions regulations. For example, a new fuel economy regulation was introduced in China, the world's largest auto market, in May 2013. This regulation will see the government subsidise the sales price of electric and plug-in hybrid vehicles, with a target of having 5 million such vehicles on the road by 2020.

Electric vehicles

Electric vehicles were initially expected to be the driving force of next generation vehicles. In December 2010, Nissan launched the "Leaf", a mass-produced EV. Other automakers followed suit. However, sales are falling well short of forecasts. The combined cumulative sales target for Nissan and Renault EVs by 2015 is 1.5 million vehicles, however only 100,000 units had been sold by September 2013.

EV sales were seriously limited by the vehicle's inability to drive long distances due to insufficient battery performance and a lack of recharging stations. Significantly improving battery performance will take considerable time. This technological drawback has seen most manufacturers postpone plans to mass produce EVs.

Micro-compact EVs, however, may become popular in some countries within a shorter timeframe. Micro-compact EVs seat up to two people and are positioned between light motor vehicles and motorbikes. They do not produce emissions, require minimal parking space and are easy to drive. Micro-compact EVs are designed for making short trips and are therefore unaffected by existing battery limitations. As such, there is currently a growing movement in Japan and some parts of Europe to promote micro-compact EVs as a practical mode of transport for the elderly and for people wanting a convenient vehicle for making local journeys.

Fuel cell electric vehicles

Fuel cell electric vehicles (FCV) are also attracting more attention as a viable alternative to EVs. Powered by hydrogen fuel cells, FCVs can fill up on hydrogen at hydrogen stations, similar to how gasoline-fuelled vehicles top-up at gas stations. FCVs are seen by many as the ultimate eco car as they only emit water.

More importantly, FCVs are able to travel distances of up to 700 kilometres on a single tank of hydrogen. The ability to travel further before refuelling could see FCV sales overtake those of EVs.

Toyota has already announced plans to commercially manufacture FCVs in Japan and the US from 2015. The carmaker introduced its FCV at the Tokyo Motor Show in November 2013 and at the Consumer Electronics Show in January 2014. Initial US sales will take place in California where some 50 hydrogen stations will be installed by the end of 2015.

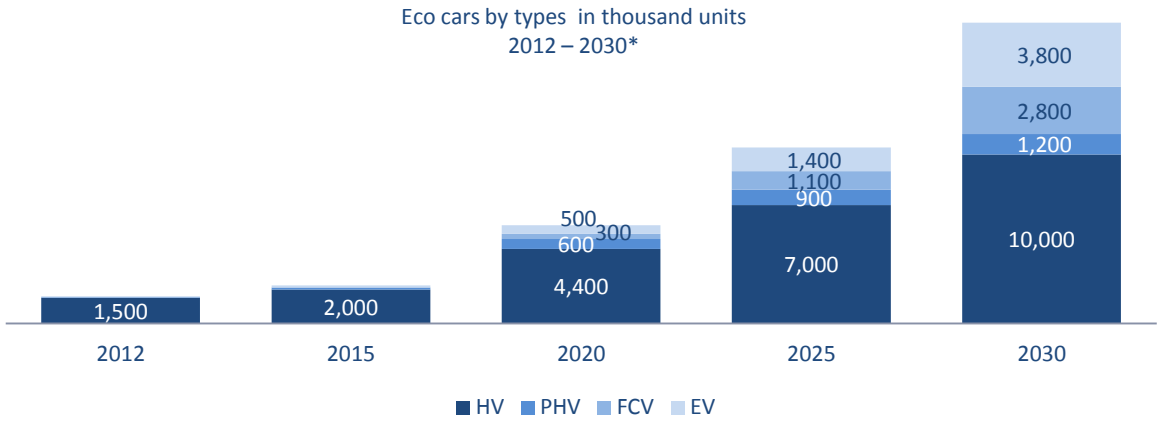
Key factors that will affect the popularity of FCVs, especially in the initial launch period, include ensuring a stable supply of hydrogen, setting fuel prices on a par with gasoline and ensuring a network of hydrogen stations. It will take some time to resolve these issues, but the industry believes they will be achieved more quickly than solving the battery capacity problems that continue to restrict the viability of EVs.

Hybrid

Because EVs and FCVs both require time and significant investments in infrastructure, there will be no practical commercial alternative to conventional gasoline-powered vehicles for the near-to-medium term. However, competition is intensifying within the hybrid vehicle market. These cars combine an internal combustion engine with an electric motor to reduce the use of gasoline and lower emissions at the same time.

Hybrid electric vehicles (HEV) such as the Toyota Prius achieve high fuel economy and reduced emissions by using the electric motor when travelling at slower speeds. Plug-in hybrid vehicles (PHV), which can be recharged using household power outlets, have recently entered the market and increased the distance that can be travelled using an electric motor alone. However, a number of issues still remain with regard to PHVs such as a notable increase in car weight due to the greater number of parts, battery-associated costs and the low availability of recharging stations.

Figure 2: Forecast sales growth for eco cars by type (2012 - 30)



Source: Ipsos Business Consulting

Note: In 2012, there was no FCV statistics while PHV and EV were recorded as 53,000 and 51,000 units respectively. In 2020, it is expected that PHV, FCV and EV will have 120,000, 10,000 and 120,000 units respectively

Eco cars: Improving internal combustion engines

On-going technological developments to improve the fuel efficiency and lower emissions of gasoline- and diesel-powered vehicles will play a bridging role until zero-emission eco cars become commercially viable in developed markets. At the same time, these more efficient hydrocarbon-powered vehicles will likely prove more popular in emerging markets where EVs will be notably more expensive in relative terms and face greater limitations due to poorer refuelling infrastructure.

Conventional vehicles

Conventional vehicles are therefor expected to continue to play a major role for the foreseeable future. For example, Mazda, is developing EVs and HEVs while continuing to improve the efficiency of its IC engines for the near and mid-term. One element of this strategy is the commercialization of an engine technology called Homogeneous Charge Compression Ignition (HCCI), which is said to improve thermal efficiency by up to 50 per cent.

In Europe, demand for diesel cars is already high and diesel vehicles already have the major market share. As a result, fuel-efficient diesel cars are currently considered mainstream eco cars. HEVs are unpopular due to being relatively expensive and less capable of high-speeds. The popularity of diesel vehicles is also on the rise outside of Europe due to market penetration of premium German brands offering these models, such as BMW and Mercedes Benz.

Flexible fuel vehicles

Flexible fuel vehicles (FFV) which reduce emissions by using alternative fuels to gasoline are also showing increased sales. More than 10 million FFVs have been sold worldwide, with the largest percentage concentrated in Brazil. Bio-ethanol, which uses sugarcane, grain, or fruit as the base ingredient is the primary form of fuel for FFVs. FFVs can also run on 100 per cent ethanol, however, sales are increasing much faster for vehicles that run on an ethanol mix (flexible fuel).

The diversification of fuel sources has also led corporations from non-auto industries to enter the market. The shift towards electricity as a key power source for vehicles is seeing many engine components change with some parts becoming redundant. The increasing computerisation of cars has dramatically changed the configuration and production of parts which is likely to see the fully-fledged entry of comprehensive electronics manufacturers and other non-auto industry players into the market.

Smart cars: Autonomous driving technology

Automotive safety technology is evolving from “passive safety” such as seatbelts and airbags, which focus on responding when an accident occurs, to “proactive safety” such as anti-sideways skid systems and automatic brakes that help avoid accidents in the first place.

Smart cars take things a step further and are equipped with various sensors to detect surrounding conditions and provide auxiliary support by automating the driving response to such conditions. Nissan announced they will commercialise such vehicles by 2020. General Motors is setting its sights of having autonomously-driven vehicles whose use will be limited to expressways in the market by 2017.

Google, an outside player, began public road tests three years ago and has conducted autonomous driving for a total of 480,000km with a target for fully operational autonomous vehicles by 2017.

Standardising parts

Automotive manufacturers need to secure resources including budget and personnel for the research and development of next generation vehicles, as well as to develop and provide low-price models suitable for emerging markets. Carmakers are therefore attempting to make their manufacturing process more efficient and reduce costs by standardising automotive parts.

Toyota will start selling new model vehicles that utilise a new production technique called Toyota New Global Architecture (TNGA) from 2015 onwards. This will see the standardisation of parts with the aim of improving development efficiency by 20-30 per cent. It will also introduce three types of chassis to further improve the standardisation approach. Toyota's strategy is to use these three chassis to develop multiple vehicle models and ultimately standardise around 80 per cent of the several thousands of parts they use. The company will also change their parts procurement process to bulk purchase minimum amounts that can be used across all vehicle models and regions.

However, the financial and operational risk from a product recall increases with the use of such a bulk procurement of parts. Therefore quality assurance will need to be improved to avoid recalls in the first place as well as enhancing financial and operational response capabilities in case a recall does occur. The substantial nature of such a risk may see procurement and standardisation only taking place with major automotive parts manufacturers.

Partnerships and alliances

The investments in new technology, infrastructure, information technology and other related areas that will be required to meet the various challenges outlined above are beyond the capability of any single automotive manufacturer. As a result, there will likely be an increase in partnerships and alliances, both among carmakers and across industries. A number of such alliances have already been announced, including in the following areas:

Designing new vehicle types (EV, FCV, fuel-efficient cars, low-price vehicles, etc)

- Toyota and BMW are jointly developing FCVs and reduced-weight vehicles.
- Daimler AG and Renault/Nissan are strengthening their co-operation on technical developments to commercialise FCVs.

Developing auto parts for new vehicle types (parts standardisation, lightweight parts, environmentally friendly parts, etc)

- In April 2013, a Memorandum of Understanding formalising co-operation between the Automotive Industry Action Group of USA, European Association of Automotive Suppliers and Japan Auto Parts Industries Association came into force. The alliance will focus on the creation, technical development and review of environmental reporting requirements as defined by technical standards organisations on a national and regional basis.

Developing new technologies (autonomous driving technology, car electronics, telematics, etc)

- Google has entered partnerships with automakers GM, Audi, Honda and Hyundai, as well as NVIDIA, a microchip manufacturer, to install Android OS in their vehicles.
- Panasonic is in discussions with several auto-parts suppliers to utilise its consumer electronics technologies, such as cameras and sensors which can be added to front and rear bumpers for use in automated parking systems.

Infrastructure investment (electricity charge stations, hydrogen stations, etc)

- BMW is planning to launch an EV in the USA in 2014. The firm will co-operate with companies in the electricity supply, real estate and parking management industries to set up rapid charger stations in several major cities.
- Toyota Group's trading company, Toyota Tsusho, will co-operate with leading French industrial gas company Air Liquide to enter the hydrogen filling station business in Japan in 2014.

While automotive industry has been characterised by rapid technological developments and the forging of new strategic alliances, the policy and regulatory environment in regard to issues such as autonomous driving and infrastructure development has not always kept pace. This reality requires the industry to work closely with governments to create a regulatory framework that will facilitate the development of the cars of tomorrow.

Your Ipsos Contacts

AUSTRALIA

PERTH
Ground Floor, 338 Barker Road
Subiaco, WA, 6008
Australia
australia.bc@ipsos.com
Telephone 61 (8) 9321 5415

SYDNEY
Level 13, 168 Walker Street
North Sydney 2060
NSW, Australia
australia.bc@ipsos.com
Telephone 61 (2) 9900 5100

GREATER CHINA

BEIJING
12th Floor, Union Plaza
No. 20 Chao Wai Avenue
Chaoyang District, 100020
Beijing, China
china.bc@ipsos.com
Telephone 86 (10) 5219 8899

SHANGHAI
31/F Westgate Mall
1038 West Nanjing Road 200041
Shanghai, China
china.bc@ipsos.com
Telephone 86 (21) 2231 9988

HONG KONG
22/F Leighton Centre
No 77 Leighton Road
Causeway Bay
Hong Kong
hongkong.bc@ipsos.com
Telephone 852 3766 2288

INDIA

MUMBAI
5th, 6th and 7th Floor, Boston House
Suren Road, Andheri (East) 400-093
Mumbai, India
india.bc@ipsos.com
Telephone 91 (22) 6620 8000

NEW DELHI
C-1 First Floor
Green Park Extension
110 016
New Delhi, India
india.bc@ipsos.com
Telephone 91 (11) 4618 3000

INDONESIA
Graha Arda, 3rd Floor
Jl. H.R. Rasuna Said Kav B-6, 12910
Kuningan
Jakarta, Indonesia
indonesia.bc@ipsos.com
Telephone 62 (21) 527 7701

JAPAN
Hulic Kamiyacho Building
4-3-13, Toranomon
Minato-ku, 105-0001
Tokyo, Japan
japan.bc@ipsos.com
Telephone 81 (3) 6867 8001

KENYA
Acorn House
97 James Gichuru Road, Lavington
P.O. Box 68230
00200 City Square
Nairobi, Kenya
africa.bc@ipsos.com
Telephone 254 (20) 386 2721-33

MALAYSIA
18th Floor, Menara IGB
No. 2 The Boulevard
Mid Valley City
Lingkaran Syed Putra, 59200
Kuala Lumpur, Malaysia
malaysia.bc@ipsos.com
Telephone 6 (03) 2282 2244

NIGERIA
Block A, Obi Village
Opposite Forte Oil
MM2 Airport Road, Ikeja
Lagos, Nigeria
africa.bc@ipsos.com
Telephone 234 (806) 629 9805

PHILIPPINES
1401-B, One Corporate Centre
Julia Vargas cor. Meralco Ave
Ortigas Center, Pasig City, 1605
Metro Manila, Philippines
philippines.bc@ipsos.com
Telephone 63 (2) 633 3997

SINGAPORE
3 Killiney Road #05-01
Winsland House I, S239519
Singapore
singapore.bc@ipsos.com
Telephone 65 6333 1511

SOUTH KOREA
12th Floor, Korea Economic
Daily Building, 463 Cheongpa-Ro
Jung-Gu 100-791
Seoul, South Korea
korea.bc@ipsos.com
Telephone 82 (2) 6464 5100

THAILAND
21st and 22nd Floor, Asia Centre Building
173 Sathorn Road South
Khwaeng Tungmahamek
Khet Sathorn 10120
Bangkok, Thailand
thailand.bc@ipsos.com
Telephone 66 (2) 697 0100

UAE
4th Floor, Office No 403
Al Thuraya Tower 1
P.O. Box 500611
Dubai Media City, UAE
uae.bc@ipsos.com
Telephone 971 (4) 4408 980

UK
Minerva House
5 Montague Close
SE1 9AY
London, United Kingdom
europe.bc@ipsos.com
Telephone 44 (20) 3059 5000

USA
31 Milk Street
Suite 1100
Boston, MA 02109
United States of America
us.bc@ipsos.com
Telephone 1 (617) 526 0000

VIETNAM
Level 9A, Nam A Bank Tower
201-203 CMT8 Street, Ward 4
District 3
HCMC, Vietnam
vietnam.bc@ipsos.com
Telephone 84 (8) 3832 9820