



CO₂ @ automotive OEMs – What to do in the short term?

Stefan Lippautz, Nick Toone and Simon Schnurrer

The CO₂ debate is changing the automotive landscape. While technological solutions will take years to be implemented, changes in buying criteria and their impact on automotive sales might be the real challenge for global automotive OEMs. This article outlines the major drivers for the industry in the context of the CO₂ issue and explores three likely scenarios for changes in regulation and consumer behaviour.

Climate change is one of the biggest issues facing society today. Road transport, in particular by car, accounts for approximately 18 per cent of greenhouse gas emissions worldwide. Measures aimed at road transport are seen as one of the main levers for reducing emissions. As a consequence, the CO₂ debate has become one of the major strategic issues facing the automotive industry as a whole. The volume of published studies are a telltale sign.

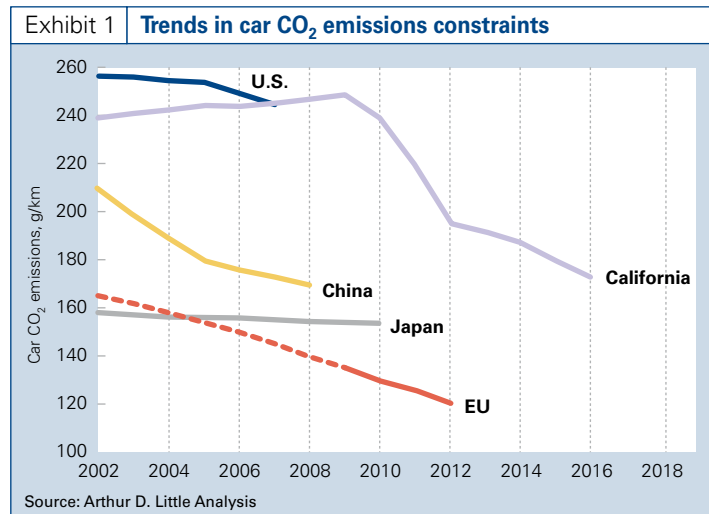
Most of these studies are rather descriptive, focusing on regulatory trends or the cost of technology paths with a mid- to long-term view. This article, by contrast, is intended to provide insights that will enable automotive OEMs to take action in the short term. We will first provide a perspective on the drivers affecting the CO₂ debate for automotive OEMs. Starting from these drivers, and taking an analogy from the 1979 oil crisis, we will then present three scenarios on the impact of the CO₂ issue on the volume of cars sold. Finally, we will outline a set of strategic actions for automotive OEMs to consider if they want to benefit rather than suffer from the CO₂ debate.

Drivers affecting the CO₂ debate for automotive OEMs

A growing number of governments worldwide are actively discussing the introduction and/or tightening of regulations to reduce CO₂ emissions. In addition to regulation, two other interlinked, exogenous drivers will set the environment for automotive OEMs: the oil price and consumer behaviour. Let's have a closer look at each of these.

1. Regulation

While the current landscape of CO₂ emission standards is very heterogeneous, the trend is the same in most regions throughout the world: vehicle CO₂ emissions are under increasing pressure through regulation both at national, super-national and local level.



In the European Union (EU), for example, seven countries (the UK, Belgium, Portugal, France, Luxembourg, Norway and Sweden) have already introduced or are about to introduce tax regimes based on CO₂ emissions, while three more countries (Spain, Germany and Ireland) are considering a similar move by 2010. However, up to now, vehicle tax has remained a relatively small part of the total cost of ownership of a vehicle.

On the super-national (EU) level, the European Commission has announced that, in addition to national taxation, it will propose a legislative framework for vehicle standards and complementary policies, if possible in 2007 and at the latest by 2008. Stavros Dimas, the Environment Commissioner, has been quoted as saying that "The EC will be bringing out legislation to cut CO₂ emissions from cars soon."

Japan first established fuel economy standards for gasoline and diesel-powered light-duty passenger and commercial vehicles in 1999 under its "Top Runner" energy efficiency programme. These fuel economy targets are based on weight class, with automakers allowed to accumulate credits in one weight class for use in another, subject to certain limitations. In case of non-compliance with the specified limits, a penalty applies. In December 2006, Japan tightened its fuel economy targets, equalling an average of 125 g/km for CO₂ emissions on the NEDC test cycle by 2015.

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China has put in place a series of fuel economy standards for a number of weight classes, while also varying car purchase tax in line with emissions.

The USA's Corporate Average Fuel Economy (CAFE) regulation has existed since the late 1970s. This establishes average fuel economy standard for cars and SUVs, with standards for SUVs becoming slightly more stringent from 2008 to 2011, and segment-by-segment SUV targets becoming mandatory from 2011. Overall per-vehicle emissions are still high, with a number of manufacturers having failed to meet the target and incurred fines as a result.

At local level, megacities are pacemakers for tightening regulations. Megacities globally account for about 75 per cent of greenhouse gas emissions. While regulations take years to be implemented at (super-)national level, large cities tend to implement concrete measures at short notice, without waiting for any national alignment.

For example, London has formulated CO₂ reduction targets that go far beyond current legislation at national and EU level, i.e. down by 60 per cent compared with London's 1990 emission level. In order to meet this target, London's Mayor has introduced a detailed action plan for all CO₂-emitting sectors. For motorists, for example, this action plan means high "congestion charges" for the right to enter the city by car. From 2008 onwards, it is proposed that the charge will depend on the level of CO₂ emissions. Large SUVs emitting more than 225 g/km of CO₂, for example, could be charged £25 per day for entering the city.

London's CO₂ action plan has already triggered significant change in car usage and purchasing patterns among Londoners. For example, only 8 per cent of morning commuters still use their cars to come to the city centre, whereas 44 per cent are using rail transport and 32 per cent the London underground, according to Transport for London.

While it is questionable whether more rural areas and smaller cities in Europe will follow the example of London, the roll-out of CO₂ abatement plans to other cities worldwide is imminent. New York, for example, is introducing an action plan similar to London's concept, called "PlaNYC".

Beijing has closed roads for cars altogether for two days in order to test the effect on air quality and prepare for the 2008 Olympic Games.

2. Oil price

Even though oil price forecasts are becoming quickly outdated and the reliability of forecasts remains questionable, few studies even today suggest an oil price in excess of \$100 per barrel for the next few years. For the purpose of the CO₂ scenario analysis that will follow, and based on today's oil price of around \$80 per barrel, we suggest an oil price range of \$60 to \$100 per barrel for the next few years, which is in line with most of the current studies.

3. Consumer behaviour

The bottom line of consumer behaviour, however, is expressed most prominently by the size and development of the new car market, both in terms of absolute volume and the relative weight of car segments.

A notable shift has taken place in public attitudes toward climate change in general and vehicle emissions in particular. In the UK, for example, a 2006 study funded by the Department for Transport showed that public awareness of climate change had almost reached saturation point, compared with very low awareness in the years before 2006. Two thirds of the public recognise that burning fossil fuels for transport is a major contributor to climate change. The majority places the onus for CO₂ reduction on national and international institutions, while a smaller group actively wants to reduce their personal contribution. Related to this, a growing population of activists is intent on direct action as a way of shaming those with a high-footprint lifestyle into changing their ways.

The bottom line of consumer behaviour, however, is expressed most prominently by the size and development of the new car market, both in terms of absolute volume and the relative weight of car segments (e.g. small city cars vs. full-size SUVs). In order to illustrate the potential magnitude of the impact of CO₂ on new car markets worldwide, we have analysed the effects of historic external shocks on these markets in Europe, North America and Japan. For example, we took an analogy from the 1979 world oil crisis. Expressed in real 2006 dollars, the peak of the oil price in 1979/1980 reached a little above \$80 per barrel – quite comparable to today's price level. Moreover, the "threat" of

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legislation was also imminent at that time with, for example, CAFE (Corporate Average Fuel Economy) standards in the USA – introduced as a result of the 1973 oil crisis – coming into effect by 1978.

Car markets worldwide were seriously affected by the 1979 oil crisis, both in absolute growth and segment mix. Many US customers, for example, changed their buying patterns overnight, preferring smaller and more fuel-efficient cars to the large cars and trucks they tended to buy before the crisis. When they found out that the US OEMs did not offer many attractive models of this kind, customers turned to Japanese carmakers. In the wake of the oil crisis, Japanese producers increased their US market share from 12 per cent to 21 per cent, according to the Japan Automobile Manufacturers Association.

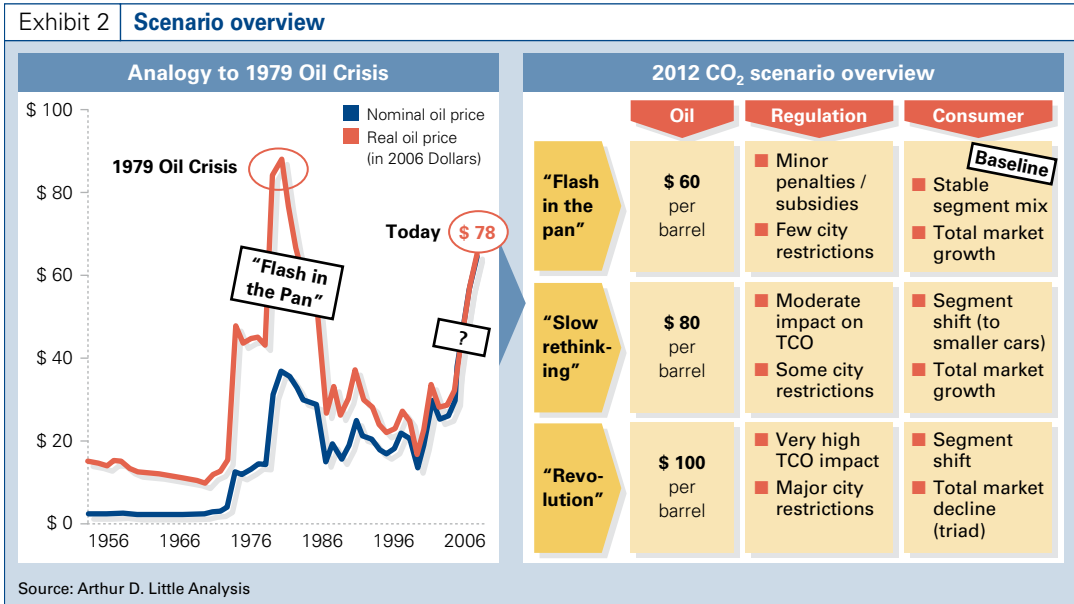
While we do not believe history will repeat itself, the historic changes in consumer behaviour can be used for market scenario calculations. Today's regulatory pressure and much more critical consumer attitude toward energy consumption add to the market dynamics today, resulting in an even more dramatic shift in consumer behaviour than in 1979.

Three different CO₂ scenarios for automotive OEMs

The analysis of the drivers and trends outlined above leads us to conclude that automotive OEMs are very likely to have to cope with sustained changes in the CO₂ context. What is uncertain, however, is the magnitude of these changes. Therefore we have developed three scenarios: a "flash in the pan" scenario as baseline, and then two scenarios with increasingly radical changes in regulation, oil prices and consumer behaviour. All scenarios are modelled on the basis of real consumer shifts observed during the 1979 oil crisis (see Exhibit 2).

Baseline scenario: "Flash in the pan"

In the least extreme scenario, most additional CO₂ control measures fall on the consumer. A growing number of markets link vehicle tax to emissions, albeit with limited impact on the total cost of vehicle ownership (TCO). Auto



lobbies may continue to convince governments worldwide that reducing CO₂ emissions in other industries costs less in investment and lost jobs than tackling cars.

In this scenario, consumer behaviour is probably not seriously impacted. Car markets worldwide may follow current growth trends, with saturated markets (for example in Europe) growing slowly and their segment mix staying rather stable, and emerging markets such as China growing strongly in nearly all car segments.

We use this scenario as the baseline for our impact analysis on OEMs.

Scenario 1: "Slow rethinking"

In this scenario, measures targeted at consumers around the world range from the introduction of more car-free urban areas to strong tax incentives for lower-emission cars. Road tax and road pricing regimes are strongly linked to emissions; for all above-average emitters (excepting luxury cars) these elements are a major part of the total cost of ownership.

Regulatory pressure increases, most notably in Europe where a segment-by-segment, weight or footprint (size) approach prevails. This may well come with tough penalties for non-compliance, or even mandatory caps on the volume of high-emission variants within each segment from single manufacturers.

Oil prices may stabilise at the current level of approximately \$80 per barrel. While total new car market volume is not reduced considerably, looking at historic parallels, certain segments come under pressure, losing sales to smaller-car segments, as consumers tend to buy smaller and more fuel-efficient vehicles.

A step-up in terms of challenge, we consider this scenario to be the most realistic.

Scenario 2: “Revolution”

In the most extreme scenario, the size of entire new car market segments is reduced significantly in response to legislation acting on consumers and carmakers. Pressure on car buyers to make green choices becomes irresistible. Many city centres worldwide ban all but zero or low-emission vehicles. Carmakers face stringent fleet emission targets in all major markets, with no segment targets to offer respite. Penalties are very harsh, involving high fines or volume caps.

Oil prices increase even more, stabilising at around \$100 per barrel. Emission-related vehicle taxes and road pricing become the dominant influences on total cost of car ownership, leading to a collapse in sales of high-emission, medium-price vehicles, such as most SUVs, large gasoline MPVs and middle-market executive saloons. Small light-car segments grow or remain stable. Only the highest-priced luxury vehicles could be immune from the tax effect – although they are increasingly a guilty pleasure, subject to social disapproval.

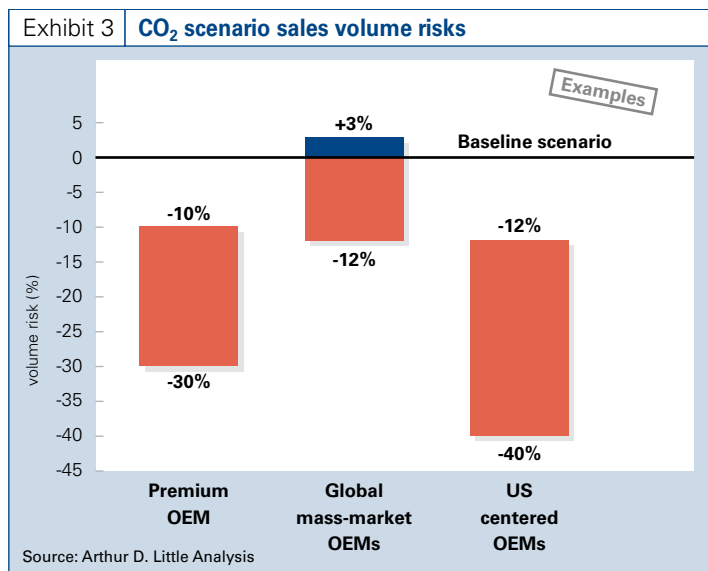
Currently we do not consider this scenario to be very likely. However, as it cannot be excluded from the list of possibilities, proactive development of strategic options for this scenario may help automotive OEMs to react on short notice if and when required.

All three scenarios presented above are relevant when making a new car market outlook for 2012. For example, vehicle segments with a very high CO₂ footprint (SUVs, pickups, large sedans, etc.) will be running a volume risk of up to 50 per cent, depending on the region and the selected scenario.

All three scenarios presented above are relevant when making a new car market outlook for 2012. For example, vehicle segments with a very high CO₂ footprint (SUVs, pickups, large sedans, etc.) will be running a volume risk of up to 50 per cent, depending on the region and the selected scenario. Other, more fuel-efficient small-car segments might be much more stable or, depending on the scenario, even able to grow. These developments have direct implications for OEMs: those that focus on sales of heavyweight vehicles with a high CO₂ footprint are running a very high risk of losing sales.

Exhibit 3 shows the result of a more comprehensive analysis of the two scenarios on the sales volume that is at risk at different types of automotive OEMs. The impact of the baseline scenario is set at 0 per cent. The upper end of the bar shows the impact of the “slow rethinking” scenario; the lower end shows the impact of the “revolution” scenario.

If the “revolution” scenario materialises, premium OEMs could be risking up to 30 per cent of their planned new car volume in 2012. However, the situation could be even worse for some US-centred OEMs. Lacking innovative fuel-efficiency technology and selling most of their cars in the American light truck segments, their volume risk could reach 40 per cent. But the risk is also real for global mass-



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market manufacturers such as Toyota or Volkswagen. In the “revolution” scenario, even manufacturers with a portfolio of efficient small cars may lose sales volume of up to 10-15 per cent if they are not going to tackle CO₂ actively, both on a technological and business level.

Actions for automotive OEMs to take

Faced with these three scenarios, what should automotive OEMs do? In order to capture the new opportunities or limit the negative impact of the CO₂ scenarios, all automotive OEMs should make choices and take actions in the five areas we outline below. We will use examples to illustrate how innovative companies are already mastering similar challenges. All the actions we propose are applicable in both the “slow rethinking” and “revolution” scenarios, albeit with different priorities, and should lead to tangible results within the 2012 time frame.

1. Achieve sales volume growth despite adverse CO₂-driven market developments

As automotive OEMs are currently focusing on the prevention or containment of negative CO₂ effects on the business, they generally put only limited effort into more offensive options, such as the development of new business based on the CO₂ debate. However, the emergence of LOHAS, the “Lifestyles Of Health and Sustainability”, could be just such an opportunity for proactive business development. LOHAS is an international trend which influences large numbers of middle-class consumers, not only in the USA – where many celebrities are serving as role models – but increasingly in Europe and Asia as well. The most striking fact about this group is their relatively high purchasing power and their willingness to spend substantial amounts of money on elegant styling and innovative technology, according to the German Zukunftsinstitut think-tank. Another important aspect is their focus on reliable and trustworthy information, word-of-mouth information patterns, and the community aspect of the LOHAS movement.

McDonald’s is a prominent example of a company that successfully targets this new group. Its goal is to benefit from the LOHAS trend, build up an image of healthy food and

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eco-friendliness, and counter public discussion and legislative threats. Among the actions it has taken in this respect are changes in the product portfolio (e.g. cooperation with the biodrink “Bionade” and the integration of bio products), the restyling of restaurants, and the indication of the number of kilocalories per item on every package. By doing so, it succeeds in attracting new consumer groups such as seniors. This example shows that LOHAS is a growing profitable target market, and that companies that traditionally may not have been considered as particularly “green” can benefit from it.

Our current estimate is that the new car market potential of LOHAS already amounts to more than one million cars per annum worldwide. Automotive companies currently address this potential only partly with specific offers. We expect this segment to grow strongly in the short to medium term, with that growth depending very much on how the CO₂ debate evolves.

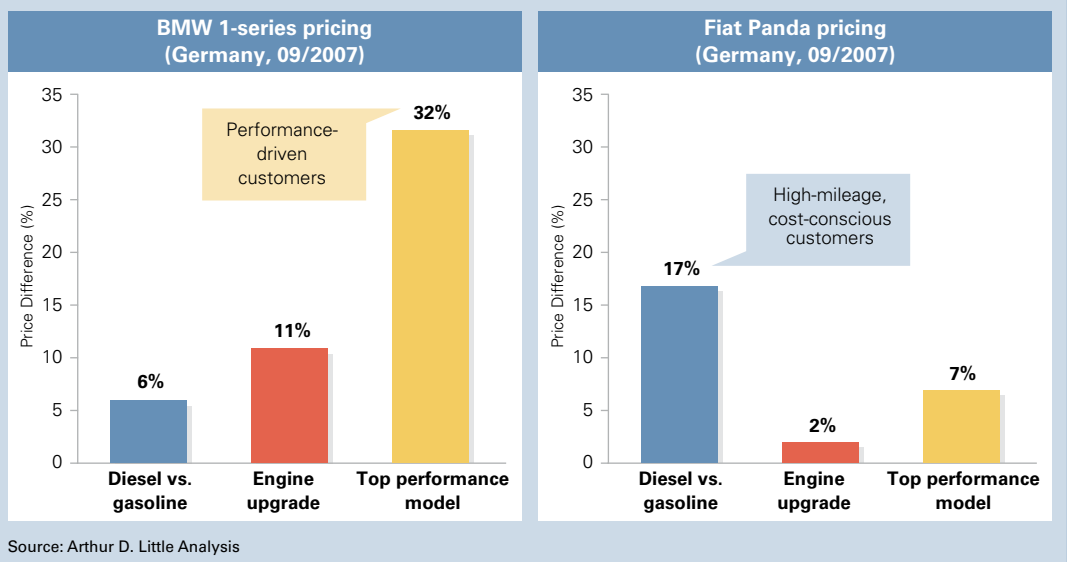
2. Stabilise margins even when customers want to “downsize” their cars

In contrast to the LOHAS business option, the protection of margins is a rather defensive strategic choice, yet very important in the CO₂ context. Analysis by several investment banks shows that the profitability of many OEMs today relies heavily on sales of powerful cars with large engines. These cars could increasingly become difficult to sell, depending on which CO₂ scenario materialises.

In this context, a comparison of BMW’s and Fiat’s pricing strategies for their entry-level model lines in the German market, i.e. the BMW 1-series and the Fiat Panda, illustrates the very different price/margin logic these two players apply.

Exhibit 4 shows the relative price premium of engine options. If a BMW customer, for example, wants to buy the top model of the 1-series range (currently the 130i), he is charged 32 per cent more than for the model just below (in this case, the 120i). On the other hand, if a BMW customer wants to buy a diesel engine, this implies a price premium of just 6 per cent, compared to 17 per cent for the Fiat

Exhibit 4 Comparison of pricing strategies



Panda's diesel engines. Now, the interesting question is: what would happen to BMW's margins if only small-engine diesel versions were sold? And to Fiat's?

Clearly, there is a need to analyse the relative risks of alternative price/margin strategies, and to develop innovative pricing and margin approaches, such as attractive "downsizing" options for consumers in line with the CO₂ scenario that materialises.

3. Retain a positive corporate/brand perception even when the CO₂ debate turns hostile

Today, nearly all automotive OEMs are already publishing some kind of "sustainability" or "environmental" report. However, these documents often lack a clear structure, tangible and measurable targets and a cohesive strategy. At the same time, investors in the automotive industry are increasingly conscious of CO₂ risks. In order to measure and track these risks, they are doing "sustainability index" analysis, comparing the sustainability performance of different companies and deriving investment recommendations from this analysis.

A good example of a response to this trend is the sustainability strategy of the BG group, a British gas-producing

company. Having developed a corporate responsibility action plan, including a Key Performance Indicator (KPI) toolbox and an “Enhanced Greenhouse Gas Management Programme”, it has established itself as a sustainability leader in several reports by large investment banks (e.g. Goldman Sachs’ ESG report).

For automotive OEMs, the question remains whether they want to develop KPIs and sustainability targets themselves or to wait until investors base their investment decisions on a rating system which they cannot influence any more. Even the clear communication of measurable CO₂ targets and the proactive development of community relations can have a substantial impact on investment decisions and ratings. Again, the magnitude of the impact will depend on the CO₂ scenario that materialises in the next few years.

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4. (Re-)claim innovation leadership in new “green” technologies

Staying competitive within an eco-sensitive environment inevitably pushes automotive OEMs towards selecting and focusing on new “green” core competencies. Moreover, there is an imminent risk that one or other large automotive supplier or OEM could occupy a monopoly position in specific competence domains.

As a consequence, the make-or-buy question becomes highly important in the current CO₂ context. “Green” innovation leadership can lead to important competitive advantages, whereas missing a trend – given the long lead times in the automotive industry – can become very expensive, in terms of both damaged image and lost sales. In order to fully utilise this potential, OEMs have to adopt a systematic approach for determining their value creation strategy – taking into account market offerings, in-house competencies and trends.

Toyota presents a good example. Starting in the early 1970s with its hybrid technology development, Toyota largely kept R&D as well as production of core hybrid technology components in-house. Even today, Toyota strongly focuses on the use of “core” suppliers, in which it has

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bought shares. It has managed to keep competitors at bay by slowing down their access to these technologies (e.g. battery technology and electro engines).

Its long-term effort put into hybrid technology is one of the main reasons why Toyota today is known as one of the most progressive carmakers in terms of environmental protection. Given the current environmental sensitivity of consumers, such an image leadership position serves well to promote new car sales. Moreover, its technology position in hybrids has already helped Toyota to catch up in other areas as well – e.g. by exchanging hybrid know-how for better market access in China (as in its hybrid cooperation with FAW) or in diesel technology (as in its hybrid/diesel cooperation with Fuji Heavy Industries/ Subaru in the USA).

5. Define and implement new profitable business models in the CO₂ context

After-sales markets represent a large potential for new CO₂-related business models. By actively developing profitable after-sales products such as eco tuning and CO₂-“checks,” automotive OEMs can not only address current and future market demands, but also increase their brand’s image with respect to environmental awareness and progress.

Achieving higher fuel efficiency and lower CO₂ emissions is especially relevant for existing cars on the market since cars are used for a long time (for example, the average German car is nearly eight years old) and driven over long distances. Improving the fuel efficiency of existing cars has a positive financial impact for the consumer in terms of fuel savings and potential fiscal incentives. Combined with a “green” image upgrade of the vehicle, this provides a potentially strong buying motivation.

General Electric is an example from another industry. It has introduced an aircraft engine upgrade kit as part of its “ecomagination” campaign. As one of the manufacturers of the widely applied CFM56-3 engine, GE now offers an upgrade technology kit to reduce an aircraft’s annual fuel consumption by almost 30,000 gallons, dramatically

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reducing the aircraft’s CO₂ footprint. There is considerable demand for these upgrade kits: to date, 200 advanced upgrade kits have been installed, with orders for 500 more to be delivered through 2007. Using positive momentum – responding to the worldwide CO₂-emission debate with its “ecomagination” campaign – General Electric effectively enhances its “green” image and further distances itself from its competitors while expanding its sales.

Insights for the Executive

Climate change is one of the biggest issues facing society. Road transport, in particular by car, accounts for 18 per cent of greenhouse gas emissions, bringing it firmly on the radar screen of environmentalists, governments and consumers worldwide. Governments and municipal authorities are enforcing tougher legislation, and consumers are changing their attitudes and purchase behaviour. In combination with higher oil prices, these development directly impact automotive markets worldwide.

Taking an analogy from the 1979 oil crisis, it is clear that buying patterns can change quickly and blow away profitability and growth outlook for automotive OEMs. Beyond the technical challenge of reducing vehicle emissions at every stage of the lifecycle, automotive OEMs can make choices and take actions through which they will benefit rather than suffer in the CO₂ debate. These actions include offensive ones, such as capturing the upcoming LOHAS market and developing new “greener” strategic positioning, and more defensive ones, such as margin engineering and smart downsizing. Taking these actions can lead to tangible results before 2012.

Stefan Lippautz

... is a Director in Arthur D. Little's Automotive & Manufacturing Group in Munich, Germany. He focuses mainly on growth strategies and innovation management across the entire automotive value chain, from development and production to after-sales.

E-mail: lippautz.stefan@adlittle.com

Nick Toone

... is a Senior Manager in Arthur D. Little's Automotive & Manufacturing Group in London, UK. He works mainly on strategy, post-merger and product strategy projects.

E-mail: toone.nick@adlittle.com

Simon Schnurrer

... is a Manager in Arthur D. Little's Automotive & Manufacturing Group in Wiesbaden, Germany. His consulting work focuses on growth strategy development, marketing & sales, technology strategies and mergers & acquisitions.

E-mail: schnurrer.simon@adlittle.com