Meeting the automotive CO_2 challenge

Beyond technology – what to do in the short term?

The CO_2 debate is changing the automotive landscape. While technology solutions will take years to implement, changes in buying criteria and their impact on automotive sales could become a real challenge for automotive OEMs in the short term. While discussion tends to focus on national regulatory developments, we believe that the large global cities will be the real pacemakers of regulation in the short term. Using the 1979 oil crisis as an analogy to assess consumer behavior and to draw conclusions on the car market of 2012, Arthur D. Little proposes a set of strategic actions, addressing the opportunities set by changing consumer behavior, but also outlining defensive moves OEMs can take to limit the potentially negative implications of the carbon discussion.

A further tightening of regulations to reduce CO_2 emissions from cars seem to be inevitable, as more and more governments worldwide are actively discussing the introduction and/or tightening of regulations significantly impacting – together with the oil price - consumer behavior.

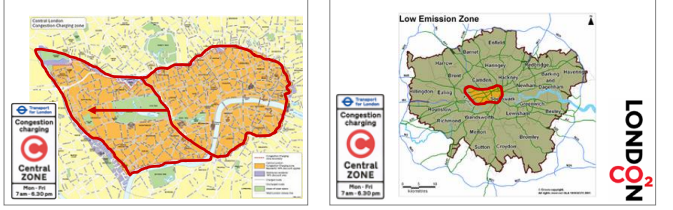
Global cities as the pacemakers of regulation short term

While we currently see a very heterogeneous landscape of CO_2 emission standards worldwide, vehicle CO_2 emissions are increasingly coming under pressure through regulation at very local level. Moreover, major cities are acting as pacemakers for a tightening of regulation worldwide, often exceeding national or pan-national regulations.

Overall, the world's "mega cities" account for about 75% of greenhouse gas emissions and represent the vast majority of consumers. If you look closely at the large-city summits held regularly throughout the world, it is even possible to observe cities competing to be the "greenest" city. While regulation at national level takes years to implement, large cities tend to implement concrete measures at short notice, with change being driven by local elections rather than by national regulatory discussions.

Take London, for example. Following the introduction of the Congestion Charge in 2005, from 2008 an approach differentiating on the basis of CO_2 emissions from individual cars will take effect. While cars emitting less than 120g/km will enter the charging zone free of charge, those emitting above 225g/km will be charged £25 per day. We expect to see further changes in buying patterns and modes of commuting as a consequence.

Situation 2007: Congestion Charging	CO_2 charging starting 2008 (will be monitored and eventually amended)
■ **Charge:** – **£8** (paid by midnight on the day of travel) ■ Penalty Charge Notice (PCN) of **£100** if congestion charge was not paid ■ Discount for alternative fuel vehicles	■ Charge will be linked to CO_2 emission of corresponding vehicle* ■ **Charge:** – **100 per cent discount** for <120g/km and meeting EU IV standard – **Standard £8 charge for** (121g/km-225g/km) – **Higher £25 charge** for (> 225g/km)



* current alternative fuel discount to be phased out, to be replaced by a technology neutral low CO2 discount

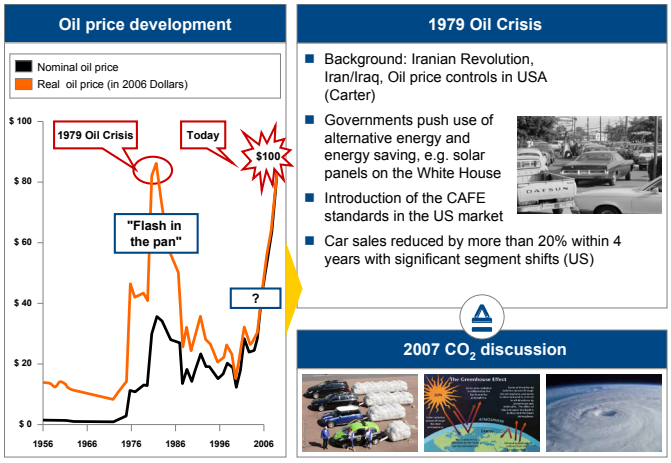
Consumer behavior and the oil crisis analogy

In the course of current developments, there has already been a notable shift in public attitudes regarding climate change in general, and vehicle emissions in particular. This can be attributed, in part, to oil prices approaching $100 per barrel, but also to increasing

costs driven by regulation and to social pressure towards a less CO_2-intense lifestyle.

Trying to predict consumer reactions is like gazing into a crystal ball, however we believe that the past might offer some hints as to where the consumer is heading.

For example, we can see that oil price as an indicator of total cost operations is now at similar levels to those reached in the oil crisis of 1979. We assume that consumer buying patterns from this period will be an excellent analogy for the development of the current car market, both in absolute terms and regarding car segment shifts (e.g. small city cars vs. full-size SUVs).



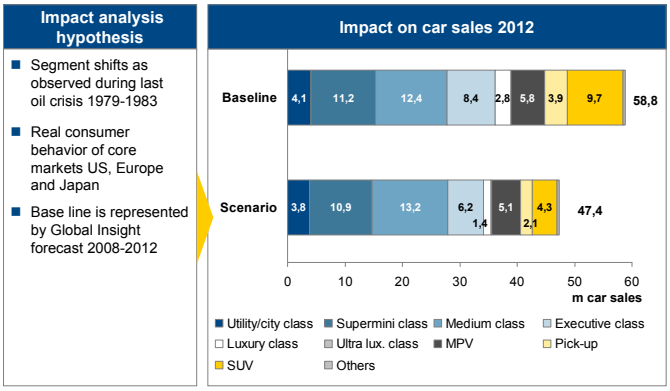
Source: ADL analysis, ADL press research, Energy Info. Administration, NHTSA * as of November 7th, 2007 ** CAFE = Corporate Average Fuel Economy

Impact on car sales 2012

During the 1979 oil crisis, car markets worldwide were seriously affected, both in absolute size and in segment mix. Many customers, especially in the US, changed their buying patterns overnight, preferring smaller and more fuel-efficient cars to the large cars and trucks they had tended to buy before the crisis.

While 30 years back the oil price explosion was a short-lived phenomenon, we do not believe this to be the case now. Today's regulatory pressure and consumers' much more critical perception of energy consumption will feed into current market dynamics, resulting in a more sustained shift in consumer behavior than in 1979.

Using car sales data from 1979–1983 for the triade markets, we have analyzed the impact of the oil price explosion on the absolute volume of car sales and on individual market segments at that time. By applying real consumer behavior from 30 years ago directly to Global Insight car market segmentation and forecast data for car sales 2008–2012, we have been able to assess the likely impact of the current rise in oil prices on markets (and individual segments) in Europe, North America, Japan, Brazil and China.

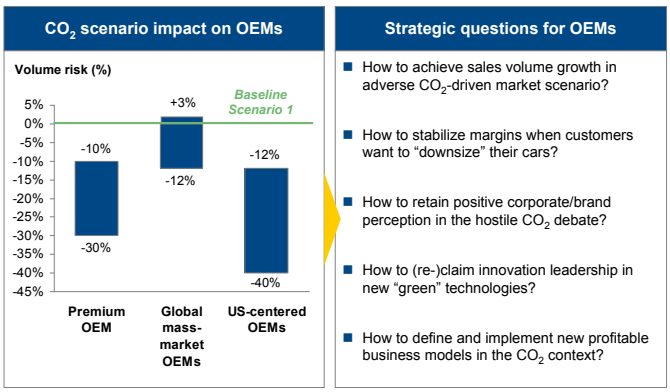


Source: Arthur D. Little analysis; Global Insight Report Sales figures

Vehicle segments with a very high CO_2 footprint (e.g. SUVs, pick-ups, large sedans, etc.) will be running a volume risk of up to 50%, depending on the region and the scenario. On the other hand, the more fuel-efficient small-car segments are likely to remain more stable, even growing in some markets.

Who will be hit most ?

Changing consumer behavior will have a direct impact on the dynamics of the automotive industry. Companies with a portfolio consisting of heavyweight vehicles with a high CO_2 footprint are running a very high risk of losing sales.



For example, in this market environment, German premium OEMs, could find up to 30% of their planned new car volume in 2012 is at risk. The situation could be even worse for US manufacturers. Lacking innovative, fuel-efficiency technology and positioning many of their products in the American light truck market segments, volume at risk could reach 40%.

But risk is also imminent for global mass-market manufacturers such as Toyota and Volkswagen. Even those manufacturers with a portfolio of efficient small cars may lose sales volume of up to 10-15% if they do not actively tackle CO_2 at both a technology and a business level.

What to do in the short term?

Depending on the individual positioning, we see five key challenges for all OEMs, either to capture the new opportunities or to limit the implications of the CO_2 scenarios described. The actions proposed are applicable to all CO_2 market scenarios, though with different priorities, and should lead to tangible results within the 2012 time frame.

How to achieve sales volume growth in a CO_2-adverse market?

With OEMs currently focusing on preventing or limiting the negative effects of the CO_2 debate on the business, only limited effort is being put into more offensive options, such as the development of new business based on CO_2 concerns.

However, the emergence of LOHAS, the Lifestyle 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 – in the US, 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 money on elegant styling and innovative technology (Source: Zukunftinstitut). Another important aspect is their focus on reliable and trustworthy information, word-of-mouth information patterns and the community aspect of the LOHAS movement.

Arthur D. Little's automotive experts estimate that the new car market potential of LOHAS already amounts to more than 1m cars p.a. worldwide. This potential is currently addressed only in part by automotive companies with specific offers. For the short-to-mid term, this segment is expected to grow strongly, with growth obviously depending very much on future CO_2 trends.

How to stabilize margins when customers want to "downsize" their cars?

In contrast to the LOHAS business option, the protection of margins is a rather defensive strategic pattern – but nevertheless very important in the CO_2 context. Analysis by several investment banks shows that today, many OEMs rely heavily on sales of powerful cars with large engines for profitability – cars that could increasingly become difficult to sell, depending on the CO_2 market scenario.

The interesting question is: What would happen to those OEMs' margins if only small-engine cars were sold?

Clearly, there is a need to analyze OEMs' price/margin strategies for relative risks, and to develop innovative approaches to pricing and margins (including attractive "downsizing" options) that best fit the relevant CO_2 market scenario.

How to retain positive corporate/brand perception in the hostile CO_2 debate?

Today, nearly all OEMS publish some kind of sustainability or environmental report. However, a look at these documents shows that they often lack a clear structure, tangible and measurable targets, and a cohesive strategy.

On the other side, financial investors in the automotive industry are increasingly conscious of the CO_2 risks. In order to measure and track these risks they are currently developing a "sustainability index" – comparing the sustainability performance of different companies – and deriving investment recommendations from this data.

For automotive OEMs, the question is whether they want to develop KPIs and sustainability targets themselves, or whether they want to wait until financial investors base their investment decisions on a rating system which the OEMs can no longer influence. Even the clear communication of measurable CO_2 targets and the proactive development of community relations can have a substantial impact on investment decisions and ratings, depending on the CO_2 scenario that materializes in the coming years.

How to claim innovation leadership in new "green" technologies?

Staying competitive within an eco-sensitive environment inevitably pushes OEMs towards selecting and focusing on new "green" core competences.

Moreover, it is becoming clear that there is an imminent risk of a monopoly situation developing for specific competence sectors, be it on the side of a large supplier or an OEM.

The question of whether to make or buy becomes highly important in the CO_2 context, since an appropriate value creation strategy can lead to important competitive advantages and even "green" innovation leadership. By contrast, given that lead times in the automotive industry are very long, missing a trend can become very expensive, both in terms of image and sales.

In order to realize the potential to gain competitive advantage, OEMs need to adopt a systematic approach to determining their value creation strategy, taking into account market offerings, in-house competences, and trends.

How to define and implement new profitable business models in the CO_2 context?

After-sales markets hold great potential for new CO_2-related business models. Increasing fuel efficiency and reducing CO_2 emissions is especially relevant for cars already on the market, since the average car is used for a long time (for example, the average German car is nearly eight years old) and driven for long distances. For the consumer, improving the fuel-efficiency of an existing car has positive financial implications (e.g. fuel savings, possible fiscal incentives) and giving the vehicle a "greener" image at the same time could provide a strong motivation to buy.

By actively developing profitable after-sales products (e.g. eco-tuning, CO_2 checks, etc.), OEMS can not only meet current and future market demands, but also increase their brand's image with respect to environmental awareness and progress.

Conclusion

While the public discussion of CO_2 emissions often focuses on regulatory trends at national and pan-national level, we believe that it is the global cities that will be the real pacemakers of regulation in the short term. Changes will be implemented locally and will have a direct influence on consumer buying behavior.

Drawing on data from the last oil crisis to gain a better understanding of consumer reactions, we outline a realistic scenario for the car market in 2012, based on real consumer behavior observed in the US, European and Japanese markets between 1979 and 1985. The results suggest that consumers might alter their buying behavior significantly, resulting in fundamental changes to the dynamics of the automotive industry. Changes in the individual consumer's CO_2 footprint are expected to have a significant impact on volumes and segment size in the short term, threatening OEMs' traditional business models as a result.

Arthur D. Little suggests that, rather than focus solely on technological solutions to the CO_2 challenge, OEMs adopt a broader approach, and proposes a strategic framework for tackling the CO_2 challenge proactively.

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