Developments in China's Automotive Market and Impact on Plastics

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In 2015, about 24.5 million motor vehicles were produced in China, accounting for about 27% of global vehicle production, and more than double the number produced in the second biggest market, the USA (Fig. 1). While automotive applications account for slightly less than 10% of the total global plastics market, this increases to 20% and more for reinforced and engineering plastics. Participants in the global plastics market therefore will certainly follow the Chinese market for automotive plastics with a keen interest.

Recent developments are going in two different directions. On the one hand, while the market grew at an impressive 15% per year in the period from 2005 to 2015, a forecast by consultancy McKinsey predicts only 5% growth for the period from 2015 to 2020. This may be somewhat too pessimistic – actual growth in 2016 was 9.5%. And the number of cars per capita in China is still very low compared to Western countries (see Fig. 2). However, the assumption that the market growth will slow down is shared by most experts as GDP growth has decreased.

On the other hand, it is likely that the amount of plastics used per car produced in China will increase substantially, and also move to higher-value materials. Any quick look at the cars in a Shanghai or Beijing car park will show that Chinese buying preferences are moving upmarket towards bigger and more expensive cars. In particular, in surveys many car buyers state the intention to upgrade their vehicle when replacing their first-ever car. More expensive cars typically are not only heavier but also have a higher relative plastics content, rising up to 15% for certain European luxury cars. With the average price of a Chinese car reaching only about 25% of the average US car, there is substantial room for price increases as the average income increases.

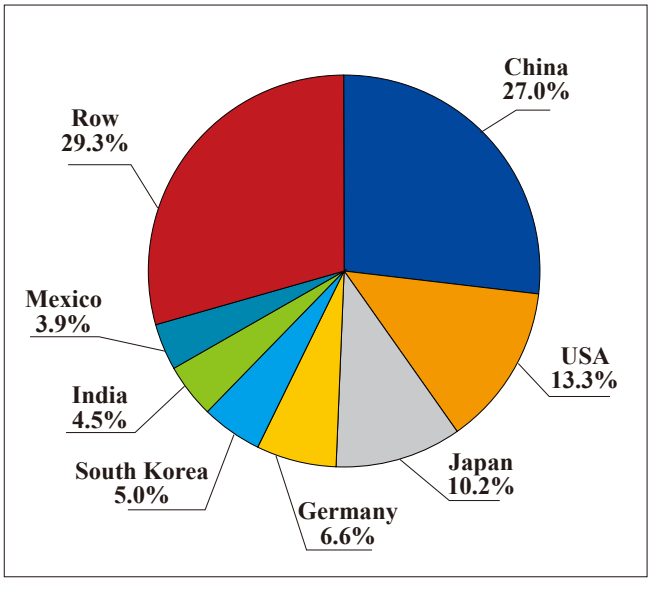

Fig. 1: Share of global motor vehicle production by country (2015)

Another driver for increased demand for automotive plastics in China is the tightened regulation. Typically, China follows European fuel efficiency and emission norms, though with some delay. These standards continue to tighten. In 2015, the Corporate Average Fuel Consumption requirement allowance was 6.9l/100 km, and there are (as yet unconfirmed) plans to reduce this to 5.0l/100 km by 2020. This will force automotive producers to look for weight savings as of course the car weight is the most important factor in determining fuel consumption – a common estimate is that a 10% reduction in vehicle weight results in 5% to 7% fuel saving. Depending on the specific application, automotive parts made from plastics typically bring weight savings in the order of 20-50%. At present, Chinese cars tend to be heavier than cars of similar size produced elsewhere, indicating a huge weight savings potential.

An additional, China-specific factor in increasing the demand for automotive plastics is the strong government support for electric vehicles (EV) and hybrids. China is already the biggest market for these vehicles, and there are numerous subsidies and other supporting measures with which the government tries to increase the attractiveness of EVs. The State Council even set up a challenging target of selling 5 million units of EVs by the year 2020, though the 2015 target of 500000 units was already missed by approximately one third. Due to the limitations of existing battery technology and the additional weight of the batteries themselves, weight reduction can command a premium in EV, favoring plastics materials. In addition, in pure EV

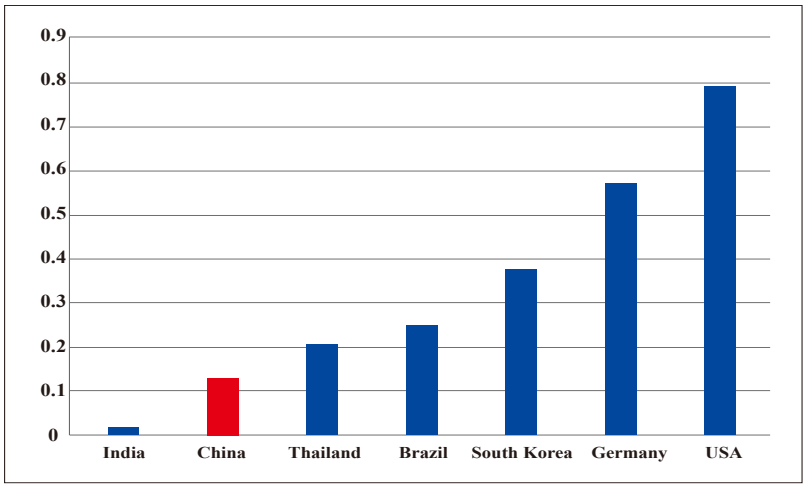

Fig. 2: Motor vehicles per capita for selected countries (2015 or latest)

there is no need for parts with extremely high temperature resistance as no fuel is burned, which opens up a larger number of parts for application of plastics and plastics composites.

As for the type of plastics used in automotive applications in China, there will likely be a shift away from polypropylene, which currently is by far the most important material. However, it is less suitable for the more demanding metal replacement applications and thus will lose some share as the application range of plastics in automotive increases. In particular, according to LANXESS, currently Chinese cars contain only about 35% of the weight of engineering plastics found in a German-produced car, hinting at a future shift in material demand towards engineering plastics. Engineering plastics will be particularly favored in the more challenging applications. Another high-growth segment is high-performance long-fiber-reinforced thermoplastic composite materials, for which in the past decade annual growth reached 30%.

The shift within the plastics segment is already reflected in the sales of some Chinese plastics compounders. A few years ago, China XD, a big Chinese compounder focusing on automotive, mainly worked with polypropylene. However, currently this share has been reduced to 17% while different types of polyamide account for 43% of their sales as the company tries to position itself in the higher end of the automotive plastics market. China XD is also exploring the use of biomass such as straw as filler material for automotive resins, which would reduce the carbon footprint of the material – an indication how the plans of the Chinese government for a more sustainable economy affect local companies.

While many of the plastics used by the Chinese automotive industry are supplied by foreign companies, there are a number of strong Chinese plastics compounders apart from China XD. Shanghai Pret also focuses on automotive, has announced plans to almost double its capacity by 2021, and in 2015 acquired US plastics company Wellman Plastics, indicating its global ambitions. Similarly, China XD already has production in Dubai. Kingfa, by far the biggest player with 7 plants in mainland China, acquired an Indian plastics compounder, Hydro S&S, and opened production sites both in the USA and in Europe. These Chinese players thus may well become important on a global level in the future. The trend towards regional diversification is matched by a similar diversification in applications – e.g., China XD is moving into bioplastics, which is partly motivated by them seeing lower growth prospects in the Chinese automotive market.

Meanwhile, foreign companies are still investing in expanding their local production in China as they have to compete with local players both with regard to costs and delivery times. In 2016, LyondellBasell started building its third China factory adding Dalian to Suzhou and Guangzhou, which will focus on PP compounding for automotive applications. DuPont Performance Materials launched its largest compounding plant globally in Shenzhen in summer 2016, citing optimism about applications including automotive as sources of future demand growth. And Celanese just announced that their China sales grew by more than 20% 2016, stating that this growth is related to the increased demand for electric vehicles, for which Celanese supplies plastics. The Chinese government is aware of China's dependency on foreign and imported plastics for specialty automotive applications as so far domestic companies only produce a limited range of varieties at the lower end of the quality spectrum. The current (13th) Five-Year Plan addresses this issue and targets an increase of the self-sufficiency rate for New Chemical Materials (which include automotive plastics) from 63% to 83%. If achieved, this target could mean a substantial decrease in imports from overseas.

Overall, for the next few years the Chinese market for automotive plastics still looks reasonably promising, with a growth rate of perhaps 10%, though future growth will have to come more and more from the plastics value used per car than from sheer growth of the number of vehicles. As the market is still immature – as indicated by the low number of cars per capita – it is likely that the black clouds looming over Western markets, such as the trends towards car sharing and self-driving vehicles, will not substantially affect the Chinese market in the next 5-10 years. Many Chinese still have not bought their first car yet and are eager to do so. This is fundamentally different from parts of the younger population in Western Europe and the US, where the status symbol may now be not having a car. ■

Recent Regulatory Developments in Plastics Additives in China

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In Western Europe, the environmental effects of some plastics additives – in particular, halogenated flame retardants and phthalates used as plasticizers – have been discussed for more than a decade. After intensive studies and assessments, the use of several of these compounds has been restricted.

In European studies, four phthalates – di(2-ethylhexyl)phthalate (DEHP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP), and n-butyl benzyl phthalate (BBP) – were found to have adverse endocrine-related effects in laboratory animal studies. The use of two of them, DIBP and BBP, is now prohibited in REACH-related applications. The other two, DEHP and DBP, are categorized as "damaging fertility and the unborn child", and their use is restricted in some applications such as toys.

The EU directive known as RoHS2, which restricts the use of certain hazardous substances in electrical and electronic equipment, gives upper limits for the use of polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) of 0.1% as flame retardant in homogenous materials, therefore also shifting demand away from these materials to non-halogenated materials.

With regard to environmental protection, China has in the past generally been somewhat behind Western European standards. For example, the level of European fuel standard Euro V (implemented in 2009) will approximately be reached by the standard China V, which will be phased in during 2017. So how is the situation for plastics additives, both the specific cases mentioned above and in general? What other regulations may producers of plastics additives face in the Chinese market?

Generally speaking, environmental issues have certainly become more and more important in China. Some problems such as air and water pollution have become very obvious and drawn the attention of both ordinary citizens and the government. As a consequence, the most recent Five-Year Plan (the 13th, for the period from 2016 to 2020) has environmental protection as one of the five core themes. This theme trickles down to the plans for the individual areas, such as the plan for the chemical and petrochemical industry. A number of measures in this plan will certainly also have an impact on the producers and users of plastics additives. Here are a few examples:

* The 13th Five-Year Plan strongly promotes moving chemical production into dedicated chemical parks, where currently only about 45% of plants are located. Individual provinces have even set fixed targets for the proportion of plants to be moved into chemical parks. This regulation may strongly affect all those producers of plastics additives which currently operate outside of chemical parks. However, it may also cause disruption in the raw materials supply for plastics additives and possibly also on the demand side.

* The plan also has a number of general environmental targets, such as the substantial reduction of water consumption, energy consumption and carbon dioxide emission per unit of GDP. The targeted 30% reduction of volatile organic compound emissions for key industries including chemicals by 2020 may force some producers of plastics additives to upgrade their emission treatment technology, or to reduce production.

* For New Chemical Materials, which by the Chinese definition includes engineering plastics, the plan sets a target for self-sufficiency – this is to rise from 63% in 2015 to 82% in 2020. This is an example for regulation which may actually positively affect the demand for plastics additives

in China. An increased share of domestic production of engineering plastics rather than a reliance on imports will go along with a larger domestic demand for the relevant plastics additives.

How about the areas which have caught the most attention in Europe – the phthalates and the halogenated flame retardants?

Start with the phthalates. In 2016, China enacted the Toy Safety National Standard GB6675-2014, which limits the content of 6 phthalates in toys to 0.1% (the same limit is given in an earlier regulation, "Limit of Harmful Substances of Coatings for Toys, GB 24613-2009). This regulation seems to be modelled after the European regulation as it sets the same limits. In addition, further restrictions for the use of phthalate plasticizers are under discussion in the area of plastics packaging. To facilitate recycling of such packaging, a draft regulation on this topic prohibits the use of phthalates in plastics packaging along with other substances that may make recycling more difficult. Currently this is only a draft, with no clear implementation date set. However, a number of foreign companies including Lanxess and Sabic already promote their phthalate-free alternatives in China.

In addition, the 13th Five-Year Plan for the chemical industry specifically mentions the substitution of phthalates by bio-based plasticizers, presumably in an attempt to pursue two goals simultaneously, increased sustainability via use of a renewable resource and greater environmental protection.

For halogenated flame retardants, so far there is no regulation targeting plastics applications in China. As a consequence, the use of flame retardants in plastics tended to be much lower than in Western markets, and a large share of domestically produced flame retardants is exported. However, recently some of the domestic producers have been adapting their products to comply with regulations in other regions, such as REACH, ROHS, etc. And China has enacted its own regulation for electronic products, which so far not restricts the use of materials such as PBB and PPDE, but mandates that these substances are already to be indicated, possibly hinting at a later prohibition. Stricter building codes in China will likely also increase the overall domestic demand for flame retardants.

Global producers of non-halogenated flame retardants have taken note. In 2016, Budenheim announced that they will strongly increase their capacity for ammonium polyphosphate, a non-halogenated flame retardant, at their Chinese production site as a consequence of the strong growth in Asia. BASF in China has started promoting a polymeric flame retardant in expandable polystyrene, PolyFR, which replaces the flame retardant hexabromo cyclododecane (HBCD).

However, the most important and relevant change for plastics additives producers related to regulation may be a tightened implementation of existing regulation. A number of factors have led to this development.

One of them is the series of explosions in chemicals warehouses in Tianjin in 2015, which caused about 180 deaths and billions of dollars of damages. The severity of the explosions was largely caused by non-compliance with existing Chinese regulation rather than a lack of regulation in the first place. This is aligned with the opinion of industry experts that in general local implementation of existing regulation is the weakest link in China's environmental protection and safety efforts.

Second, the pressure on chemical companies to comply with existing regulation has increased substantially. In many chemical segments, there have been reports about factory closures or capacity reductions due to noncompliance with environmental regulation. The government has also started to punish wrongdoers much more severely.

Certainly, the stricter implementation of environmental regulation will increase for those producers of plastics additives which did not comply with regulation in the past. Potentially this may lead to a market consolidation as generally, smaller producers tend to be less compliant and also have less resource to upgrade their production equipment to meet higher emission standards.

Finally, it should be pointed out that the growth rate of China's economy will also have major impact on the market for plastics additives. The government has set a target of an annual GDP growth of at least 6.5% to 2020. For the chemical industry, the comparable value has been set at 8%. However, the government aims to focus this growth in the area of higher-value chemicals at the expense of commodities. For example, the government forecast for annual PVC growth to 2020 is only 4.6%. So, for certain plastics additives such as PVC plasticizers, demand growth may end up being well below GDP growth. ■