Component makers stretch the envelope

Component manufacturers in India are going all out to employ the latest technologies and processes to achieve incremental innovations in their quest to develop lighter and greener parts. **Shobha Mathur** spoke to a clutch of companies for this feature.

As fuel efficiency and reduced emissions become the new mantra for driving growth and meeting regulatory norms in the Indian automotive market, component makers are beefing up their research and development (R&D) spends to enable a greener tomorrow.

Making this possible are their R&D investments, for which most industry players are setting aside an annual budget of over three percent of their toplines with a major chunk earmarked for innovative non-polluting technologies. For instance, powertrain solutions provider BorgWarner incurred an R&D expenditure of four percent, 3.3 percent and 3.9 percent as a percentage of net sales during calendar years 2011, 2010 and 2009 respectively.

Valeo's global expense on R&D revolves around an annual six percent while Hella's R&D expenditure was 346 million euros (Rs 2,190 crore) worldwide in FY 2011. Rane Group company, Rane Brake Linings (RBL) has an R&D budget of about two percent of sales or 20 percent of capital expenditure. Out of this, RBL apportions about 25 to 30 percent for developing green technologies.

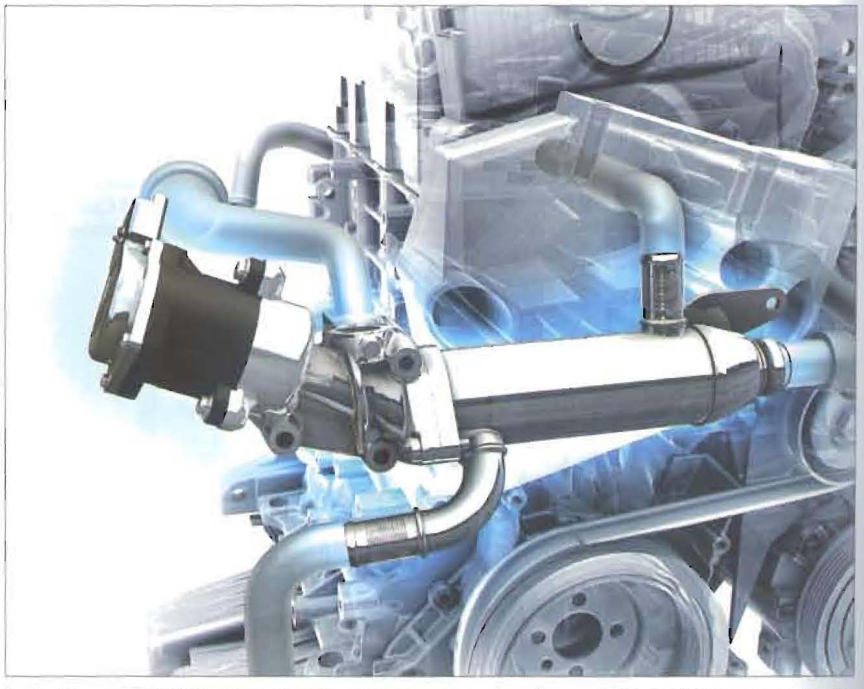
For Federal-Mogul, the R&D spend hovers between three and four percent of OE sales that runs into $100 million and $150 million (Rs 511-Rs 760 crore) globally with the majority spent on innovative green technologies. Japanese component maker Denso plans to spend 285.0 billion yen (Rs 171.7 billion) in FY 2012, 9.2 percent of its global consolidated sales worldwide with environment-friendly product development being the focus.

Optimised processes, optimised benefits

Contrary to popular belief, green manufacturing processes do not necessarily entail spiking up production costs. In fact, many of the manufacturing units have optimised processes which ensue in savings through reuse and controlled recycling of raw materials.

With reduction of emissions and fuel consumption being the key growth driver for all vehicle segments today, components too have to help increase both motor mileage and performance. The challenge for the luxury vehicle segment is still greater in terms of adopting green technologies as well as ascertaining fuel efficiencies and reining in CO_2 emissions.

Denso recently developed a starter for stop/start systems that shortens waiting time when restarting the engine and an electric air-conditioning system for hybrid buses as part of its environment-friendly package. It also developed four new heat



Valeo has upgraded thermo-dynamics in internal combustion engines. Cooling systems for air intake allow higher charge pressures and direct fuel injection systems to improve combustion.

Denso revealed some of its recently-developed eco-friendly products like a starter for stop/start systems and new heat exchangers at the Auto Expo.

exchangers – radiator, heater core, condensers and evaporators – for the Indian market. By reducing different types of materials in use by more than 70 percent and sharing production lines, it was able to considerably decrease resources and energy invested in each product.

Globally automobile manufacturers have identified and declared some materials as 'not green' or 'hazardous' in nature or declared 'limits' of acceptance criteria in particles or substance size (by weight in percent or PPM). The list includes lead, antimony, potassium, chromium and some of its derivatives. Even the copper fibre /powder, which is traditionally used in friction material, is being considered for a 'ban' in USA after 2020. Interestingly, this ban is meant for elimination or reduction of copper debris washed away by automobile users, for preserving the 'endangered' fish population in open rivers.

In line with this upcoming regulation, RBL, like other friction material suppliers globally, has begun addressing this issue. It is exploring current material composites and downsizing to less than five percent from current levels of 10 to12 percent by 2013-14 or less than 0.5 percent in some used grades by use of alternate fibres and powders equivalent to copper in performance.

"RBL has also eliminated hazardous lead in all its railway brake blocks since 2010-11 that are being supplied to the Indian Railways and for the export markets. Antimony related compounds such as tri-oxides or sulphides and potassium titanate whiskers are other materials for which equivalent alternatives have been developed and put to use," says P S Rao, president of RBL.

Meanwhile, Denso is evaluating future powertrain trends globally and working on product development for various powertrains including petrol, diesel, hybrid, electric and fuel cell vehicles. Its Indian subsidiary even plans to introduce an engine management system which can comply with BS V and stricter fuel-efficient regulations to be introduced in the future. Additionally, it is developing fuel-efficient products for the two-wheeler segment as well.

In terms of processes, Denso is cutting greenhouse gas emissions in its overall supply chain and working on energy saving activities by promoting energy conservation in equipment through development of proprietary production technology.

RBL, on the other hand, is addressing the emission intensity due to high electricity consumption in an energy intensive industry by opting for alternate energy sources like windmill and bio-mass power. This has resulted in about 60 percent reduction of CO_2 emissions. Other initiatives like improving efficiency of motors, switch-off during idle time, in-bound/out-bound logistics or optimisation in vehicle usage has resulted in CO_2 reduction by 20 percent.

Among other component makers, Federal-Mogul which produces piston rings, friction material, sealings and bearings works with local energy providers to minimise its energy utilisation requirements in its manufacturing facilities. Last year, the company introduced a new elastomeric compound, called K16 that was developed by in-house material scientists.

This material eliminates a costly and energy-intensive curing process used throughout the industry. The process upgrades the company's technology in Unipiston-bonded hydraulic clutch pistons and facilitates reduction of the environmental footprint in

INTERVIEW P S RAO, PRESIDENT, RANE BRAKE LININGS

In which way can the auto industry play a more active role in protecting the environment?
More and more hybrid vehicle usage is the only option to reduce emissions and consumption of petroleum and diesel fuels. But we know this scenario is many years away – yet we need to develop technologies required for such cars in advance. For example, hybrid car batteries are the most critical requirements which need to be prioritised by the Indian auto component industry.

How do you rate Indian companies' capabilities in developing cleaner tech/ processes compared to their foreign counterparts?
Indian passenger car and commercial vehicle manufacturers have not yet reached the level of manufacturing alternate fuel or even fuel-efficient cars.

"More and more hybrid vehicle usage is the only option to reduce emissions and dependence on fossil fuels."

How can one achieve a balance between price competitiveness and being environment friendly?
Continuous efforts are required to identify cost-effective alternative materials with equivalent results. It needs extensive testing at R&D facilities, both as input materials and as a final product, to validate and approve new alternate or green materials.

The Rane Group has been engaged in energy-saving measures since quite some time. This is a solar power generating unit and a reverse osmosis plant (below) at the Rane Brake Linings plant.

Turbo Energy Ltd's LEED building at Paiyanoor in Tamil Nadu packs a host of eco-friendly measures that help save nearly 65 percent of the energy that a regular building would waste.

manufacturing operations, thereby reducing CO_2 emissions and natural gas consumption.

"We are launching our new eco-friction low-copper ceramic and non-asbestos organic brake pads that will meet future environmental legislations. This greener brake formulation is becoming a global requirement and our development programs are on a global scale," remarks Vishy Seetharaman, director (global marketing), Federal-Mogul.

On the other hand, Hella's product portfolio straddles battery sensors, voltage stabilisers, converters and components for electric vehicles and hybrids, sensors and actuators for powertrain applications, LED as energy efficient light source and mercury-free HID burners. And, like RBL, the component maker also leverages lead-free soldering to minimise emissions.

Building a greener, energy-efficient future

A case in point is of the Chennai-based Turbo Energy, a joint venture of BorgWarner Turbo Systems, Brakes India and Sundaram Finance and an OE supplier of turbochargers. TEL recently displayed its prowess in how a green building can save nearly 65 percent of the energy that an ordinary building would waste. The effort was rated high by the US Green Building Council as well.

To elaborate on TEL's initiative, its new administration building at Paiyanoor in Tamil Nadu was completed in May 2009 in line with the requirements of the platinum rating of the LEED (Leadership in Energy and Environmental Design) green building certification system. At the time of certification, it was adjudged the second greenest building in the world in this category.

Apart from an ideal east west alignment of the building to avoid solar heat gain and to fulfil the demanding green building criteria, TEL adopted energy conservation features for walls, roof and glazing as well as several renewable energy sources. The walls of the building were doubled using stabilised soil cement foundry sand bricks as inner wall and an aerocon block outer wall, combined with 50mm of insulation in between providing protection against extreme weather conditions.

The roof was equipped with insulation on the inner side and with albido paint on the outer side, reflecting 82 percent of solar heat and therefore significantly supporting the cooling of the whole building. The third major optimisation was the intelligent double glazing that ensures maximum reduction of artificial light during daytime.

"Undoubtedly, you have to invest more money into a green building than into a normal one. But in the end, it really pays off, because of the significantly reduced energy costs", says R Ramanujam, chairman and managing director, who implemented the project in TEL. "Also, sunlight instead of artificial light has a positive effect on the well being and motivation of our staff."

A cycle of rebirth

BorgWarner has been focusing on fuel-efficient products for on- and off-road vehicles around the world in which its

INTERVIEW V SEETHARAMAN, DIRECTOR (GLOBAL MKTG), FEDERAL-MOGUL

How do you think the auto industry can play a more active role in protecting the environment?
The automotive industry can focus on systems solutions. An example is our new Advanced Corona Ignition System (ACIS), which has enabled around 10 percent fuel economy in current powertrains. ACIS is applicable in powertrains that can accommodate lean fuel strategies, including exhaust gas recirculation, for still higher fuel efficiencies.

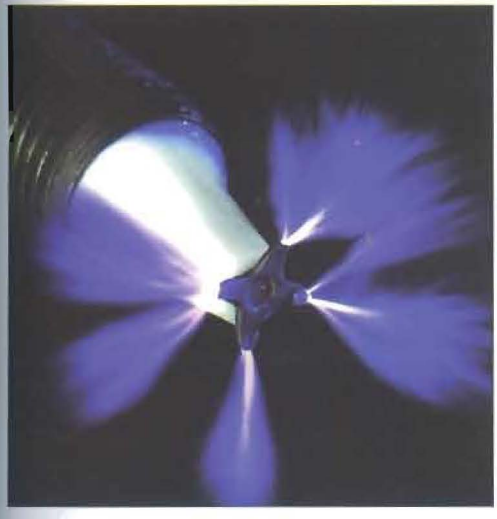
Your view on capabilities of Indian companies in developing cleaner tech.
Many Indian companies are selecting global technology partners since the local market is rapidly adopting global emission standards and companies are marketing their products in international markets.

Vishy Seetharaman: "Our ACIS has enabled around 10 percent fuel economy in current powertrains."

In which way can the government play a more active role in helping industry reduce its carbon footprint?
Over the past couple of years, the Indian government has launched a number of policies and held several discussions to facilitate OEMs and suppliers to 'go green'.

The government is keen to implement Euro 5 norms by 2015, especially in the top 11 cities where Euro 3 and 4 norms are already in place. CO_2 norms have not yet been implemented in India, but have been under discussion between government and the automotive industry for some time now.

Better implementation of policies and development of proper infrastructure will go a long way in helping the auto industry to go green. Within the auto segment, however, there is a stark difference in the shift to becoming greener. While the light vehicle segment is being upgraded to Euro 5 standards, commercial vehicle OEs are just transiting to Euro 4. Aligning the efforts of both the government and the industry will help ensure that policies announced are implemented, and adequate infrastructure is provided.



Federal-Mogul's ACIS (below left) uses a high-energy, high frequency electrical field to produce repeatable, controlled ionisation, creating multiple streams of ions to ignite the fuel mixture throughout the combustion chamber, whereas conventional spark ignition (right) creates only a small arc in the gap between the electrodes of a spark plug. ACIS has enabled an up to 10-percent fuel efficiency.

INTERVIEW DR NAVEEN GAUTAM, MANAGING DIRECTOR, HELLA INDIA ELECTRONICS

How can the auto industry play a more active role in protecting the environment?
Since we will see different powertrain concepts in parallel for the next two decades, the automotive industry has to provide energy efficient solutions at least for all these concepts but drive in a sustainable way the development and introduction of new solutions, such as EVs.

This requires contributions from government and energy providers to establish the required infrastructure.

Your comments on the capabilities of Indian companies in developing cleaner tech/processes.
Indian companies understand the requirements, responsibility and need for it. However, due to the market pressure and delivery expectation, not all companies are equipped to place it at the top of their priority list.

What about governmental support for a greener industry?
The Indian government has taken a lot of initiatives. For example, it is about to set up a National Mission for Hybrid and Electric Hybrid Vehicles. It also plans to encourage the automotive industry by reducing excise duties for design and development and manufacturing of related parts. It would be also significant to fully exempt customs and countervailing duty for imported parts. However, supporting the entire industry's development necessitates certain more requirements.

Dr N Gautam: "Indian firms understand the requirements, responsibility and need for green technology but not all are equipped to accord it top priority."

How can the government help industry reduce its carbon footprint?
The Indian government can look at initiatives successful globally which are not limited to the production and duties of these technologies and vehicles. Both the industry and the government need to work in public-private partnership mode to provide the required infrastructure for the end consumer. Further, policies and taxation structures should be clear and for a long term to ensure return on investments.

Globally, there are heavy subsidies on fossil fuels that are partly subsidised by carbon taxes in various industries. An additional model could be used to further encourage the industry for higher investment in green technologies.

The Anand Group has several eco-friendly measures ranging from compost plants (left) through to HC-free water-based paint systems.

turbochargers, exhaust gas recirculation valves, pressure sensor glow plugs and electric air pumps lead the charge. It also offers the eGearDrive electric drive transmissions, eAWD electric secondary axles and electric cabin heaters to facilitate electrification in EVs. Besides, it conserves, recycles and reuses its resources at its manufacturing facilities to cut down costs.

Similarly, Denso is working on the perfect energy factory. In this activity, energy consumption is visualised, the conditions of energy consumption evaluated based on 115 improvement methods, and improvements enabled with the help of all employees. An example of its CO_2 reduction activity is its 'energy just in time system' (EJITS) that supplies energy in just the right amount at the necessary time based on operation plans of production lines. The PEF activity has already been introduced in the Denso factories in India, and EJITS will be shortly introduced.

The 13,000-employee/ 18-company strong Anand Group, on the other hand, has formulated an environment, health and safety policy for the Group to deal with issues related to emission control, waste management and waste water management. For instance, Group company Victor Gaskets India Ltd (VGIL)was recently elevated to the status of a green company based on its initiative of making its gaskets 100 percent asbestos-free. VGIL also introduced a new heat shield product that is expected to target future emission standards and will reduce CO_2 and NOx emissions.

The 18-company strong Anand Group has in place an environment, health and safety policy related to emission control, waste management and waste water management.

Flagship company Gabriel India Ltd (GIL) that manufactures shock absorbers is planning to introduce lighter products which will cut steel consumption and other raw materials, and promote use of hollow piston rods instead of solids. Even the process of MIG welding is being modified to laser welding that will dent power consumption and energy as well as minimise gas emissions.

GIL recently bought a high-tech plating process which has increased its plating capability over its conventional counterpart. Moreover, the process has ensued in additional benefits of zero discharge, zero effluence and 1/10th water consumption, reduction in greenhouse gases with an estimated four-tonne carbon dioxide emission reduction each year.

Further, there are plans to use water-based instead of solvent-based paints, for limiting floor volatile organic compound (VOC) emissions. The company's overall target is to reduce 50 percent energy consumption over the next three years.

Valeo, likewise, has upgraded the thermo-dynamics in internal combustion engines. The component maker provides cooling systems for air intake that allows for higher charge pressures and direct fuel injection systems to improve combustion and avoid engine knock. The company's cooled EGR solution for petrol engines enables increased compression ratios (and

INTERVIEW TRIBHUVAN RASYARA, GROUP HEAD – iEHS, ANAND AUTOMOTIVE

In which way can industry play a more active role to protect the environment?
Though products have evolved through new designs that have improved fuel efficiencies, the issue of sustainable growth is now more pressing than ever. The environmental impact of the automotive industry continues to rise. The measures to reduce the environmental impact from production processes and products have been outweighed by an enormous rise in the transport demand. Industry must integrate its concern towards the environment into its core decision making.

How do Indian companies fare versus foreign firms on the cleaner tech front?
It is no secret that today, the world is totally connected. Indian companies or the Indian arm of companies are participating in exhaustive

research in real time with their colleagues, just like anywhere in the world. So there is hardly any gap left. Indian companies are making inroads into the development and execution of research plans quite significantly, on their new product lines.

In what way can the government assist the industry in reducing its carbon footprint?
In the Indian context, coordination among industry, government and research institutions is the need of the hour. We will continue to depend on the government for creating national scale infrastructure once the new technologies of hydrogen fuel cells or electric cars comes in. Meanwhile, we need to strengthen this partnership, spread awareness and encourage shift to a responsible behaviour in terms of how our businesses are impacting the environment.

therefore performance) without negative effects on the engine (such as engine knock). The system is adapted from diesel engine EGR systems and allows real-time optimal combustion control in petrol engines, thereby providing a fuel saving of four to seven percent.

Dual-clutch transmissions optimise gear ratios for optimum energy efficiency. Hence, Valeo has opted for a dry clutch solution with electro-mechanical actuators as the best energy-saving solution. The reduction in CO_2 emissions is approximately two percent on a manual transmission and eight percent on a hydraulic automatic transmission.

"The next step in electrification is affordable hybrid that recovers energy during deceleration and reuses it during acceleration (regenerative braking), assisting the combustion engine. It is a low voltage system (48V) with a new compact motor generator and a much cheaper solution than current high-voltage hybrid systems. We are targeting it next," reveals P R Dhaamodharan, Group president and managing director, Valeo India.

Normally, cutting CO_2 emissions involves improving the overall energy equation of an average automobile. LED lighting is one part of the solution. Its light output makes it the most efficient source of light for automotive vehicles. For an equivalent quantity of light, LEDs consume 12W in low beam, whereas halogen bulbs need 65W. A vehicle using LEDs instead of traditional bulbs for lighting and signaling functions would save 2.8 grams of CO_2 per kilometre.

Soldering ahead the lead-free way

Lead-free soldering processes are fast catching up in the industry for assembling electronic components and the UNO Minda-NK Minda Group, whose electronics components were assembled with lead soldering processes till two years ago, has now adopted it for assembling. These products are currently being supplied to German carmaker Volkswagen with other customer enquiries pouring in.

"We are planning to introduce this process for manufacturing our entire electronic product range in phases, in a three- to five-year timespan, in line with customer needs and requirements," elaborates NK Minda, chairman of the UNO Minda-NK Minda Group. "We are currently

COMMENT NK MINDA, CHAIRMAN, UNO MINDA GROUP

UNO Minda Group, whose electronics components were assembled with lead soldering processes till two years ago, has now adopted a lead-free operation for assembly jobs.

On how the industry can play a more active role in protecting the environment
The automotive industry has adhered with the Euro emission compliance norms to limit the impact of greenhouse gases with the introduction of more efficient petrol and diesel engines, electric and hybrid vehicles, and fuel cell and hydrogen-fuelled vehicles. The industry is also coming up with newer technologies and processes like end-of-pipe treatment, pollution prevention, designs for environment and sustainable development.

On capabilities of Indian companies in developing cleaner tech/processes
It is an established fact that European companies are way ahead in greener automation and implementing environment-friendly processes than Indian firms. However, awareness in Indian firms is also increasing now.

On how the government can play a more active role in helping industry reduce its carbon footprint
The government is making efforts to establish infrastructure for introducing clean fuels to many cities pan India. This helps manufacturers like us to introduce environment-friendly CNG kits which are reliable, safe and efficient.

There is a growing demand from vehicle owners for eco-friendly CNG kits.

INTERVIEW SHISHIR JOSHIPURA, MANAGING DIRECTOR, SKF INDIA

What is SKF India's annual R&D expenditure?
The SKF Group is committed to providing customers with superior solutions and higher value through constant innovation in products and services. In addition, constant technology upgrade provides competitive advantage to our customers by integrating different products, systems and services. SKF Group's investment in R&D has increased nearly 27 percent over the previous year and majority of the research work has been focused on developing products to help reduce carbon emissions. Additionally, SKF has invested nearly $175 million in developing technical centres across the globe on R&D.

How much of this is spent on developing greener technologies?
Almost all future developments on technology are focused on creating sustainable technologies and as such a substantial portion of our R&D expenditure is towards development of greener technologies.

How is SKF advancing towards greener tech?
SKF Group possesses a rich knowledge bank of engineering excellence. Our 'Power of Knowledge Engineering' motto comprises rich domain expertise and deep understanding of customer environment, enabling us to deliver sustainable solutions.

We deploy this expertise to create products that save more energy during their operating life than what was consumed to manufacture them. For instance, we have introduced energy-efficient bearings which can reduce friction loss by 30-50 percent, resulting in significantly higher performance and reduced energy loss.

What steps are underway to reduce carbon footprint?
SKF is committed to sustainable development in all aspects of operation. A few our initiatives to reduce the carbon footprint are:

BeyondZero: Launched in 2005, the BeyondZero initiative is the company's vision to conserve natural resources and protect the environment. As part of its two-pronged strategy, SKF has embarked on reducing the negative environmental impacts from its own operations and offer innovative technologies to help customers achieve their environmental growth.

Reduce CO_2 emissions: Through 2011, the Group has set a voluntary target to reduce CO_2 emissions from its own operations by 5 percent annually, irrespective of production volume.

Water conservation: We are focused on rain water harvesting initiatives and conserving natural resources. This has enabled the company to to save 40 percent of the water consumed at its manufacturing plants. SKF India has created capacity for 1.05 million litres of water harvesting and facility to recharge 3 million litres of water to manage the depleting water table.

Any new eco-friendly tech that SKF plans to invest in?
Technology development is a constantly evolving landscape. In line with the sustainable principle of the Group, we are developing several green solutions for different applications. We have already many products such as our E2 series bearings (Energy Efficient), and the recently launched StopGO system for two-wheelers among others.

E2 taper roller bearing.

Cleaner technology comes at a cost. How do you achieve a balance between price-competitiveness and eco-friendliness?
We believe that customers today are increasingly seeking sustainable long-term performance from their technology partners with increased focus on lifecycle costs encompassing reliability, efficiency and safety and do not necessarily use first cost of ownership as the only factor for selection. We believe that this is the only responsible way for growth.

Is it a bigger challenge to invest in more efficient technology in the mass market car/bike segments, since they tend to be price sensitive?
Customers are increasingly seeking higher value, best-in-class performance. SKF has provided several solutions to specific industries in question which are not only more efficient but also lower in cost, both first and lifecycle!

We believe that price-sensitive segments provide a strong motive force for higher innovation and enables customers to make strategic decisions and establish a sustainable competitive advantage.

How do you think the automotive industry can play a more active role in protecting the environment?
Climate change is indeed a growing concern and all industries should align their product development process to address the impact on the environment. Innovation is the key lever that all industries should deploy to address the concerns on sustainable development.

Focus on energy efficiency and lifecycle performance coupled with partnering governments in drafting appropriate legislations and consumer education will help the automotive industry address the issue of climate change.

On the capability front, how would you compare Indian and foreign companies?
There is a heightened awareness among Indian companies for the need of clean technology to address the issue of climate change and conserve natural resources. In sheer capability terms, there is not much to choose. However, Indian companies can enhance the effectiveness through a higher focus on R&D, industry-academia partnership and focus on sustainable development.

Any role the government can play to help the industry reduce its carbon footprint?
India has several challenges to overcome and sustainable development is one of them. While government can create an enabling environment through policy intervention, I will advocate that industry should act proactively and focus on this dimension since going green has always made sense and will continue to makes sense always.

evaluating these objectives and will be able to come up with a gameplan for reducing the carbon footprint in some time. In case volumes pick up for the cleaner and greener technology processes that we introduce in our facilities, cost competitiveness will not be a challenge," he adds.

The green mantra

Overall, it is amply clear that the way forward for automakers worldwide is through the adoption of cleaner technologies and incremental innovations.

While greener technologies and processes do come at a cost, in the long term they make complete business and social sense. As distinct from 'end-of-pipe' abatement technologies, green technologies minimise the generation of waste streams in production processes and utilise waste from other consumption goods and processes. They are less intensive in raw material and energy usage and therefore cost advantageous. And in a fast-changing world where consumers increasingly view a visibly green company – and its products – far more positively than they do others that are less so, the benefits can only be sustaining in the long term. ■

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