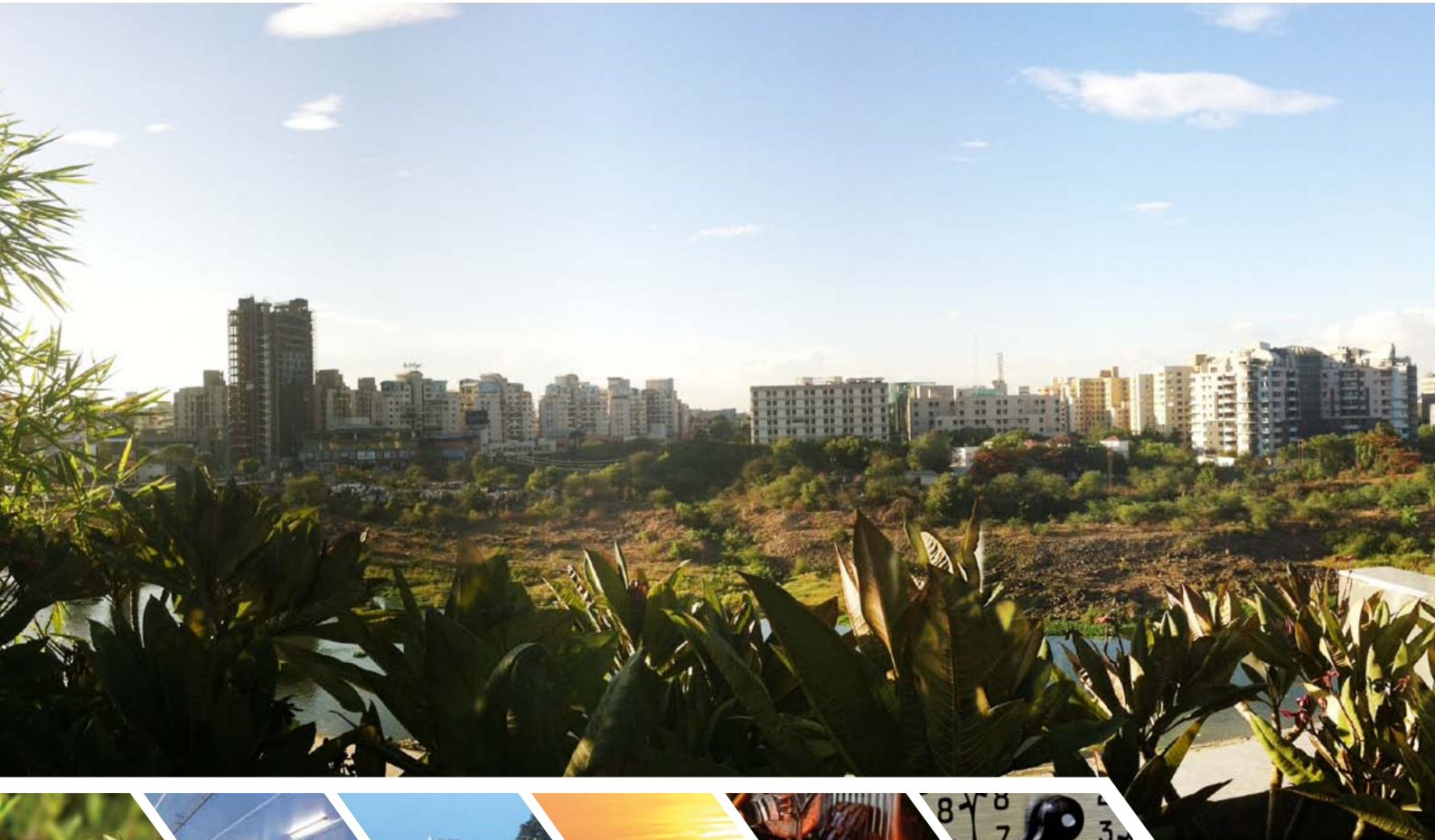


Resource and Energy  
Efficiency Network  
**Pune**





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## Preface

DEG – Our business is developing.

DEG – Deutsche Investitions- und Entwicklungsgesellschaft mbH, Cologne, member of KfW Bankengruppe (KfW Banking Group), is one of the largest European development finance institutions. For 50 years, DEG has been financing and structuring the investments of private companies in developing and emerging-market countries.

DEG invests in profitable projects that contribute to sustainable development in all sectors of the economy, from agriculture to infrastructure and manufacturing to services. It also focuses on investments in the financial sector in order to locally facilitate reliable access to capital.

DEG's aim is to establish and expand private-enterprise structures in developing and emerging-market countries, and thus create the basis for sustainable economic growth and a lasting improvement in the living conditions of the local population.

In addition to its finance and consulting services, DEG offers the Public-Private Partnership Programme (PPP) of the Federal German Ministry for Economic Cooperation and Development (BMZ). This programme unites developmental goals and private-sector commitment, mainly from German and other European enterprises, who can use the funds from the PPP Programme to carry out development projects in developing and emerging-market countries. Several times a year, DEG holds PPP ideas competitions, in which interested companies can submit their project proposals, which are then assessed by DEG for their PPP eligibility. Up to date information about ongoing ideas competitions of all participating organisations can be found under the website [www.developpp.de](http://www.developpp.de).

Environmental and resource protection is one of the most important sectors in which an Indian-German cooperation offers is mutually beneficial, not only from a private entrepreneurial but also from a public developmental point of view. Supporting industry driven initiatives to improve environmental conditions in India matches the interests of the BMZ. Improved profitability due to investments in resource efficiency shows that such initiatives will not only be successful but also sustainable.

This is why we are pleased to contribute to our project partners, WIKA Alexander Wiegand SE & Co. KG and Arqum GmbH and their associated partners, to introduce the concept of a resource efficiency network among a group of companies located in Pune.

We wish to express our thanks to all cooperation partners who contributed to the successful completion of this PPP project. Furthermore, we would like to congratulate all companies on achieving measurable resource efficiency improvements. As highlighted in this brochure, the results of this initiative show the compatibility of environmental protection through the efficient use of natural resources and cost-effectiveness.

We hope that we can encourage further companies in India to consider new ways to increase resource efficiency and protect the environment.

DEG – Deutsche Investitions- und Entwicklungsgesellschaft mbH

Cologne, September 2012



## The Network

Companies around the world recognize the benefits of systematic environmental protection. With the right approach, they are able not only to reduce their operational costs and use resources more efficiently, but also to operate more independently in the face of rising costs of commodities and energy.

As the name of the program, Resource and Energy Efficiency Network (REEF) suggests, professionally coordinated networks can greatly assist organisations striving for ecologically responsible growth. These networks consist of companies with similar interests and goals in environmental protection. Within the network, companies are given the opportunity to exchange experiences and pool practical knowledge, resulting in the development of cost-effective resource and energy efficiency programs.

Resource and energy efficiency networks have been operating successfully not only in Germany and Europe for the past 15 years, but also in important industrial regions in China and Brazil.

In 2009 for the first time, Arqum together with its cooperation partners WIKA Alexander Wiegand SE & Co. KG and the Applied Environmental Research Foundation (AERF) brought the concept of REEF to India. Between 2010 and 2012, the following companies from Pune took part in this highly profitable approach to sustainability:

- > Bharat Forge Limited
- > Mercedes-Benz India Private Limited
- > Micro Supreme Auto Industries (I) Pvt. Ltd.
- > RSB Transmissions (I) Ltd.
- > Sauer-Danfoss India Pvt. Ltd.
- > Thermax Ltd.
- > WIKA Instruments India Pvt. Ltd.

As highlighted in this brochure, all companies are actively implementing measures to reduce their environmental impact and are already benefiting from the resulting cost savings. Through trainings and the exchange of experience with other companies, they have acquired new practical knowledge in resource efficiency with which they can continue to promote environmental protection.

The project partners would like to congratulate and thank all participating companies for having actively participated and making this project a great success!



## Objectives

Many developing and emerging countries are experiencing high economic growth, which can strain the availability of resources. Companies in these countries are therefore faced with many challenges, including energy and water shortages and also increasing costs of energy and other resources. Thus many companies are embracing eco-efficient strategies to reduce their environmental impacts while encouraging productivity.

With the slogan "Protect our environment – reduce your costs!" the network showcases the compatibility of industrial environmental protection and economic competitiveness through the following objectives:

- > Reduction of environmental impacts
- > Increased resource efficiency
- > lowered operational costs
- > Support and further development of environmental management systems (ISO 14001/ISO 50001)
- > Raised staff awareness for a reasonable use of resources
- > Staff information and training in environmental management
- > Promotion of the network partners as a best-practice-models for sustainable and green business in India



## Concept and Implementation

Over a period of two years, participating companies in Pune worked together with Arqum to improve their environmental standards and generate cost savings by implementing energy and resource efficiency measures. The main components of REEF Pune consisted of a series of group workshops and individual onsite consultancy sessions. These two parts combined the expert knowledge from Arqum on strategic and operational environmental protection; unique experiences from several different industries; and technical expertise from technology firms to create an extensive network of partners.

In the workshops, representatives from each company came together to learn about relevant environmental management topics, such as optimization of lighting, heat recovery, optimization of wastewater facilities, and waste management. The group workshops proved to be an effective platform for companies from diverse industries to exchange their knowledge and experiences on environmental protection and management. Moreover technology experts were invited to give presentations on innovative technologies to inform companies about current and new technologies that may help achieve their environmental goals, covering topics such as compressed air, lighting and ventilation/cooling.

## Results

Seventy-two representative measures were analysed for the overview of the project results. One the company profiles, only a few measures are presented. With the implementation of cost and resource saving measures such as reuse of waste water and discharged heat, improvement of compressed air systems and lighting, and adoption of solar energy, the participating companies in Pune may reduce their resource utilisation by 47,233,531 kWh, save more than 49,000 m<sup>3</sup> of water, and reduce CO<sub>2</sub> emissions by 12,571,130kg, with a total cost savings of 86,713,130 INR (Table 1).

The type of improvement measures employed by the companies varies greatly, ranging from replacing technologies, utilizing different resources or optimizing processes. The most amount of improvement measures are under the organisational/others category, while the rest of the measures are distributed to water, waste and other resources like steel or metal and electricity saving measures (Fig. 1)

Figure 2 shows that besides controlling the highest cost savings were achieved in the fields process heat, heat recovery, waste and organisational. Nevertheless, improvements in other technologies, such as compressed air, lighting or drives and pumps show considerable financial savings.

The second component of REEF included four individual onsite consultancy sessions conducted at each company. According to their individual needs and goals, representatives from the companies alongside Arqum consultants incorporated information learned during workshops into the development of their environmental programmes. Based on detailed assessments, specific objectives and measures were developed to create resource and cost saving environmental management programmes.

Workshop Topic	Onsite Consultancy
1 Kick-off, project organisation	Resource and energy efficiency assessment
2 Optimization of lighting, efficient utilization of energy in the industry	
3 HVAC, compressed air, experience exchange	Resources and energy efficiency program development (objectives and measures)
4 Industrial waste water technology	
5 Waste management, hazardous substances	Programme implementation
6 Renewables	
7 Carbon footprint, biofuels preparation of brochure, programme Review	Programme review

Electricity, natural gas, other energy sources	47,233,531	kWh
Water	49,063	m <sup>3</sup> p.a.
Waste or other resource savings	3,053	tons p.a.
CO <sub>2</sub> emissions	12,571,130	kg p.a.
Cost savings	86,713,130	INR

Table 1 Overall results of REEF Pune

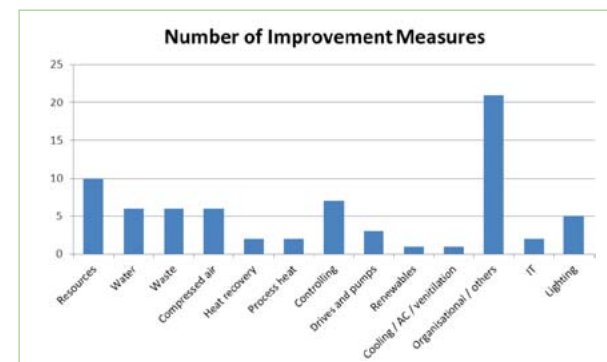


Fig. 1 Number of improvement measures

Measures concerning energy saving comprise more than 80% of the total financial savings. The biggest share of the energy savings is caused by improvements in stationary combustion to save diesel or natural gas. (Fig. 2)

Although the electricity savings compared to the total energy saving are small, only 4%, the economic impact of measures in this area is remarkable. Roughly 20% of the total cost saving is caused by power saving measures. Saving electricity is especially important in India due to high costs and limited availability. Noteworthy contributions include improvements in drives and pumps, compressed air, lighting, controlling systems and organisation (Fig. 3).

Figure 5 demonstrates that an investment in new technologies pays off. Resources saving activities not only reduce the environmental impact of the participating companies, but also have a positive economic impact. Over 80% of the calculated improvement measures have an amortisation period below 3 years. More than 70% even have an amortisation period below 1 year or require no financial expenses, showing the cost-effectiveness of implementing improvement measures. Organisational improvements and measures with a short payback period already became effective during the course of the project by the participants.

Investing in energy and resource efficiency not only results in energy savings and economical benefits but also reduces emissions of greenhouse gases such as CO<sub>2</sub>. By implementing the planned measures, more than 12,500 tons of CO<sub>2</sub> emissions can be reduced. The highest reduction of emissions results from measures for the stationary combustion - as it also has the highest saving in kWh; but also organisational measures and improvements in lighting systems have a huge impact. With a per capita emission of 1.37 tons per year (IEA, 2009), the calculated CO<sub>2</sub> reduction is equal to the emissions of 9,176 people in India. Overall savings, low payback periods, and a large CO<sub>2</sub> reduction potential clearly demonstrate the benefits of intensive engagement in improving energy and resource efficiency.

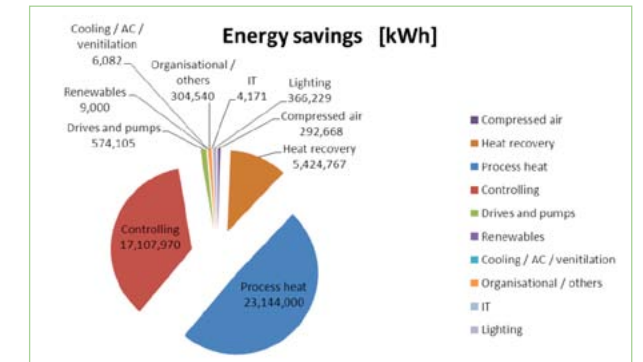


Fig. 2 Energy savings in kWh

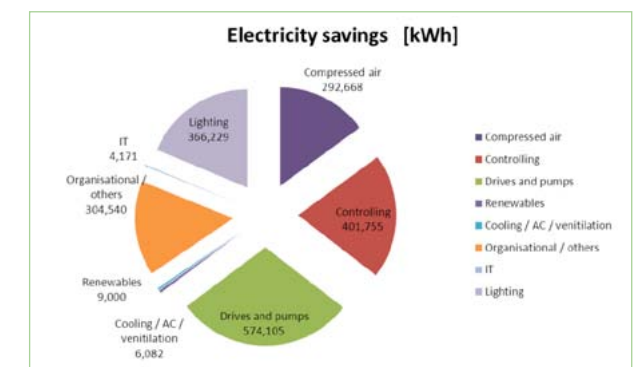


Fig. 3 Electricity savings in kWh

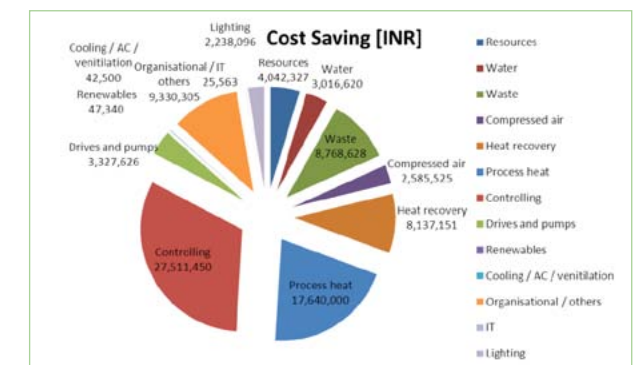


Fig. 4 Cost savings per type of measure

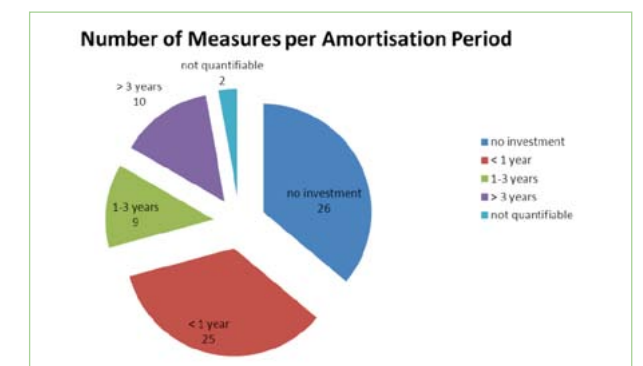


Fig. 5 Economic attractiveness of improvement measure



## Arqum GmbH

Arqum – Gesellschaft für Arbeitssicherheits-, Qualitäts und Umweltmanagement mbH is a German consultancy specializing in Environmental, Occupational Health & Safety, Energy and Quality Management. Since our founding in 1998, we have advised more than 1,800 organisations in their commitment to a sustainable and quality-driven business. Our services cover the following areas:

- > EHSQ advisory (ISO 9001, ISO 14001, OHSAS 18001)
- > Energy Management (ISO 50001)
- > Legal Compliance Audits
- > Resource and Energy Efficiency Audits
- > Carbon Management (PCF, CDM)
- > Resource and Energy Efficiency Networks (REEF)
- > Regional Environmental Networks (ECOPROFIT®, ECOfit, LEEN®, REEF)
- > Qualification and Training
- > Sustainable Mobility

By taking an analytical approach, we target the establishment of internal competencies in our clients' organisations while promoting sustainable growth for the future. We achieve this by implementing tailor-made solutions in close collaboration with our clients at every stage of the project. Our hands-on attitude is one of the essential factors of our success.

The establishment and implementation of industrial Resource and Energy Efficiency (REEF) Networks within the international development cooperation is one of our key competencies.

### Contact

Arqum GmbH  
Aldringenstrasse 9  
D-80639 Munich, Germany  
Phone: +49 (0)89 12109940  
Fax: +49 (0)89 12109949  
Email: [arqum@arqum.de](mailto:arqum@arqum.de)  
Internet: [www.arqum.de](http://www.arqum.de)



Jens Haubensak  
Head International Projects



Martin Wohlmuth  
Manager Projects India



## Applied Environmental Research Foundation (AERF)

The Applied Environmental Research Foundation (AERF) is a registered non governmental organisation (NGO) based in Pune, India. AERF works towards biodiversity conservation at the grass root level – in the field of community-based conservation. The foundation develops natural resource management models that actively involve local communities in the cause of conservation.

Since its inception in 1994, AERF has been engaged in creating a link between conservation research and its actual use in the practices of sustainable development. AERF believes that establishing this link would aid not only ecosystem development, but also efforts in poverty alleviation.

AERF has undertaken organized development and livelihood based projects, such as the widely publicized World Bank funded program, to develop decentralized bio-fuel centers in the Raigad district of Maharashtra. The Foundation has also been expanding its scope of work and interests by taking on purely research based projects.

Through its diverse programmatic focus, AERF is engaging important stakeholders in the process of biodiversity conservation. Through AERF's business and biodiversity program, the organisation has been successfully conveying the need for active private sector participation in conservation.

AERF's partnership with ARQUM for REEF project is one of the ways to convince corporations to take contrastive measures by adopting cleaner technologies and processes. This will go long way in dealing with the formidable environmental challenge - climate change.

AERF has also received international recognition for its work on sacred groves. In 2007 AERF Director Dr. Archana Godbole received the Associate Award by the Whitely Foundation for Nature (WFN), UK. This recognition of her work has helped AERF upgrade its initiatives.

AERF is member of number of important networks among others - International Union for Conservation of Nature (IUCN), Roundtable on Sustainable Biofuels, Clinton Global Initiative and Platform on Agro-biodiversity research.

### Contact

Applied Environmental Research Foundation (AERF)  
C-10, Natya Chitra Co-op Hsg. Soc. (Kalagram)  
Bhusari Colony, Kothrud,  
Pune – 411052 Maharashtra, India

Tel: + 91 - 20 - 25286952  
Email: [info@aerfindia.org](mailto:info@aerfindia.org)



Jayant Sarnaik  
Deputy Director







Bharat Forge Limited (BFL), the Pune based Indian multinational is a technology-driven global leader in metal forming having trans-continental presence across a dozen manufacturing locations, serving several sectors including automobile, power, oil and gas, rail & marine, aerospace, construction & mining, etc.

With manufacturing facilities spread across India, Europe, US & China, Bharat Forge manufactures a wide range of safety and critical components for the automotive & non-automotive sector. It is the country's largest manufacturer and exporter of automotive components and leading chassis component manufacturer.

Over the years BFL has built a strong base of intellectual capital. Highly skilled and motivated manpower, with over 1200 engineers engaged in various manufacturing disciplines are driving the company's global thrust.

Bharat Forge will use its strong platform of metallurgical knowledge, design & engineering capability and manufacturing prowess, to create a strong position for itself in these sectors.

#### List of improvement potentials

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
installation of 2 recuperators to reduce consumption of furnace oil	0.37	1,500,000	4,005,000	2,670,000 kWh	605
regenerative burner to save HFD	4.69	19,400,000	4,132,151	2,754,767 kWh	625
reduction of furnace capacity from 18 t/h to 12 t/h, increasing of oil temperature, flue gas for preheating of the combustion air	0.04	1,000,000	25,059,322	16,706,215 kWh	3,788
implementation of energy management system - 15 metering points, control of cooling system	0.69	1,500,000	2,160,000	360,000 kWh	320
changing of 17 pumps for induction heating,	0.64	1,500,000	2,356,200	392,700 kWh	350
exchanging of 600 lamps with T5 lamps	2.13	3,069,600	1,438,560	239,760 kWh	213
<b>Total</b>			<b>39,151,233</b>		



#### Bharat Forge Limited

Mundhwa,  
411 036 Pune

Founding year: 1961  
Sector: Manufacturing  
Number of employees on site: 3,400

Contact person:  
Salim K. Jamadar  
Senior Manager  
Phone: +91 - 20 - 2670 2777  
E-Mail: salimjamadar@bharatforge.com  
Website: www.bharatforge.com



Bharat Forge REEF-Team



Mercedes-Benz India has been delighting customers with strong brands and a wide range of products equipped with the latest in automotive technology. The company has been the pioneer of the luxury car segment in India with its inception way back in 1995. It is the only luxury car maker in India to have such a wide range of cars. The different ranges available today are the C-Class, CL-Class, CLS-Class, E-Class Saloon, E-Class Coupe, E-Class Cabriolet, GL-Class, M-Class, R-Class, S-Class, SL-Class, SLK-Class. Mercedes-Benz India has also already introduced our high performance AMG cars in India off late like the G 55 AMG and the SLS AMG.

The depth of choices within these ranges is also extensive with different petrol and diesel engines. The time difference between the global and Indian launch of its latest models is constantly optimized.

#### List of improvement potentials

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
Organic waster convertor	1.2	20,000	18,000	1.2 t waste	-
Sewage water treatment and re-use to save fresh water (STP Initial cost and upgradation)	10.9	7,500,000	683,100	36,135 m <sup>3</sup>	-
Variable Frequency Drive for compressor	0.5	200,000	326,318	62023 kWh	55
Variable Frequency Drive for shop Air Handling Units	1.8	1,660,001	895,334	170215 kWh	152
Solar energy utilization	5.9	280,000	47,340	9000 kWh	8
Recycling and reuse of water at car wash outside shower test	0.5	222,820	400,200	1778 m <sup>3</sup>	-
<b>Total</b>			<b>2,370,292</b>		



Mercedes-Benz

#### Mercedes-Benz India Private Limited

E-3, MIDC Chakan, Phase III,  
Kuruli Et Nighoje, Taluka: Khed,  
410 501 Pune

Founding year: 1995  
Sector: Automobile  
Number of employees on site: 980

Contact person:  
Dinesh Advant  
General Manager  
Phone: +91 - 2135 673230  
E-Mail: dinesh.advant@daimler.com  
Website: www.daimler.com



EHS Team



Micro Supreme Auto Industries (I) Pvt Ltd.

Sr. No 49, Opp Shatrunjay temple,  
Katraj Kondhwa Road, Kondhwa(BK),  
411 048 Pune

Founding year: 1984  
Sector: Manufacturing  
Number of employees on site: 170

Contact person:  
Umesh Kulkarni  
General Manager  
Phone: +91 - 20 - 6683 6900  
E-Mail: umesh.kulkarni@microsupreme.co.in  
Website: www.microsupreme.co.in



EHS Team

"Micro Supreme", an ambitious enterprise initiated in 1984 has manifested a phenomenal rise since then. Mainly engaged in design, development & production with 3 divisions:

1. Automotive & precision Engineering division: Precision mechanical components & assemblies being used in automotive engine, gear box, power steering systems as well as power generation, shipping & precision engineering industries.
2. Testing systems division: Environmental testing systems, laboratory testing systems, customized testing systems being used in automotive, chemical, electrical & electronics industry etc.
3. Measuring instruments division: Manufacture measuring instruments, relation gauges, jigs & fixtures.

Our main forte is automotive sector.

#### List of improvement potentials

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
Improvement at driver for chamfering	0.9	150,000	163,200	24,000 kWh	21
Centreless Grinding	1.4	100,000	73,440	10,800 kWh	10
process improvement: Reaction piston Drilling, Remming & Slot Milling	0.2	50,000	209,304	30,780 kWh	27
Change 7.5 hp motor with 5 hp motor	0.1	10,000	76,092	11,190 kWh	10
Air compressor kept off in lunch time(0.5 hrs/day) 7.5 HP motor	-	0	228,072	33,540 kWh	30
replacement of CRT monitors with LCD monitors which will consume less power	5.5	25,000	4,563	671 kWh	1
<b>Total</b>			<b>754,671</b>		



Sauer-Danfoss India Pvt. Ltd.

Gat No. 94-100, High Cliff Industrial Estate,  
Wagholi Rahu Road, Village Kesnand,  
412 207 Pune

Founding year: 2004  
Sector: Manufacturing  
Number of employees on site: 150

Contact person:  
Arun Pawar  
Asst. Manager  
Phone: +91 9373793027  
E-Mail: appawar@sauer-danfoss.com  
Website: www.sauer-danfoss.com



EHS Team

Sauer-Danfoss is organized for both efficient product and technology innovation and efficient service to Original Equipment Manufacturers (OEM) customers.

To best serve diverse geographic needs, we've located facilities around the world – to best serve customers at the local level. Being close to customers enables us to better understand customer needs and to respond quickly to their needs. The international nature of our business requires careful and thoughtful integration of business processes to allow for successful growth. We want to make it easy for customers to do business with us locally – anywhere in the world.

We often refer to our business as „glocal" – a global company that thinks globally and acts locally.

#### List of improvement potentials

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
Changing of 25 CRT monitors with LCD monitors	8.3	175,000	21,000	3,500 kWh	3
Pressure regulators to reduce pressure where only low pressure is needed	1.1	8,000	7,200	1,200 kWh	1
Reduction of flow rate of the venting system during nighttime	-	0	42,500	6,082 kWh	5
Awareness programme for stand-by losses for IT	-	0	27,960	4,000 kWh	4
<b>Total</b>			<b>98,660</b>		







**Thermax Ltd.**

Plot No. D-1,D-7, D-13 MIDC  
Chinchwad  
411 019 Pune

Founding year: 1976  
Sector: Manufacturing  
Number of employees on site: 1,100

Contact person:  
Chandrakant Darawade  
Sr.Manager HSE  
Phone: +91 - 20-66122517  
E-Mail: cdarwade@thermaxindia.com  
Website: www.thermaxindia.com



Thermax HSE Team

Thermax is a global solution provider in energy and environment engineering. It offers products and services in heating, cooling, waste heat recovery, captive power, water treatment and recycling, waste management and chemicals.

Thermax brings its rich experience gained from customer engagements around the world. Through technology partnerships and strategic alliances, it provides superior value to help industry perform efficiently and profitably.

Thermax is a leading, global company specializing in the areas of generation and conservation of energy and preservation of the environment. With an annual turnover of US \$200 million, the company provides integrated services and equipment in Boilers and Heaters, Captive Power, Cooling, Water and Waste Solutions, Enviro and Chemicals. It has joint ventures with Babcock & Wilcox and Energy Performance Services.

**List of improvement potentials**

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
Implementation of Inverter based emergency lightening	0.4	15,000	35,000	Lead acid batteries reduced	-
Re arranging of plate layouts as L-seam instead of C-Seam for better utilization of plate material	-	0	304,000	Less plate material (steel) used	
Removal of stress relieving operation (below 16 mm thick shell) resulted in to reduction of fuel burning to achieve saving of LDO	-	0	1,640,000	18,860,000 kWh	5,979
Installation IRIS make ballast for 24 lamps in plant 14	-	Internal labour	46,560	4,484 kWh	4
Energy saving by switching OFF compressor in Tube shed	-	0	238,300	39,601 kWh	35
Use of electric hand tools for grinding instead pneumatic tools and there by switching off GA - 37 compressor	-	No additional investment	1,058,400	105,600 kWh	94
<b>Total</b>			<b>3,322,260</b>		



**WIKAL Instruments India Pvt. Ltd.**

Plot No. 40, Gat No. 94+100, Hi-Cliff Industrial Estate, Village Kesnand, Wagholi, 412 207 Pune

Founding year: 1997  
Sector: Manufacturing  
Number of employees on site: 250

Contact person:  
Nitin Kshirsagar  
Dy. General Manager  
Phone: +91-20-66293356  
E-Mail: nkshirsagar@wika.co.in  
Website: www.wika.co.in



WIKAL REEF-Team

WIKAL Instruments India Pvt. Ltd. Pune is a wholly owned subsidiary of German multinational organisation, WIKAL Alexander Wiegand SE & Co. Kg who is the leading manufacturer of Pressure & Temperature measuring Instrumentation in the world. WIKAL Instruments India Pvt. Ltd. is engaged in the business of manufacturing of Instrumentation for Pressure & Temperature measurement, having state of the art manufacturing facility at Pune, India. The factory is well laid out with state of the art production facilities, test equipment and a modern machine shop, to cater the need of manufacturing of pressure & temperature measuring instrumentation. The organisation has established and operates a quality and environment management system according to requirements of International Standard ISO 9001-2008 & ISO 14001-2004. Efforts are made to continuously improve Quality and Environment performance in the organisation.

**List of improvement potentials**

Measure	Payback period [years]	Invest [INR]	Savings [INR/year]	Resource savings [/year]	CO <sub>2</sub> savings [t/a]
Lighting Energy saving. 200 light replaced by high efficiency lamps	0.8	504,000	475,031	63,336 kWh	56
Vacuum Air - Installed Transmitter and Controller for vacuum control	0.9	5,000	5,512	735 kWh	1
Compressed air - Reduced pressure by 0.2 bar, Made synchronization between two compressors, removed leakage, used wind ventilators and removed two electric fans	0.1	2,000	216,107	28,815 kWh	26
Water sewage treatment plant installed. Re-use of 1 m <sup>3</sup> water/day	5.0	500,000	100,000	360 m <sup>3</sup>	-
CNC Machine conveyer - Intermittent switching on and off through timer instead of continuous operation for 25 machines	1.5	80,000	55,512	6,520 kWh	6
Soldering stations water recycling-prevent wastage - 2 m <sup>3</sup> /day	0.1	30,000	200,000	600 m <sup>3</sup>	-
<b>Total</b>			<b>1,052,162</b>		





