Machinery and
Equipment Industry

THE MACHINERY INDUSTRY IN THE GREEN ECONOMY ERA

INDUSTRY MEETING FOR SUSTAINABILITY

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THE MACHINERY INDUSTRY IN THE ERA OF GREEN ECONOMY

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LIST OF FIGURES

SUMMARY

CNI PRESENTATION

The diversity of the national industry and the significant availability of natural resources reveal excellent opportunities for the sustainable development of Brazil, combining economic growth, social inclusion and environmental conservation. The materialization of concerns related to sustainability in the strategic agenda of enterprises and governments is a reality. Apart from isolated cases of success, the consequences of this attitude are felt in entire sectors of the economy. Further advances are still needed, but the path has already been identified and going back is impossible.

After coordinating an unprecedented critical thinking process on sustainability with 16 industry associations, the National Industry Confederation (CNI) delivers to the Brazilian society a wide range of information on progress, challenges and opportunities yet to come. The results presented here may not portray the significance of the discussion process experienced by the industry in preparing these documents. Developments on the process will be beyond the Rio +20 Conference, and are definitely incorporated on the daily lives of companies.

The subject of sustainability is inserted differently in each of the industrial sectors. However, some elements are common to all. The continuous pursuit for efficiency in use of resources and the need to increase industrial competitiveness are on the agenda of all the sectors. Encouraging innovation and scientific and technological development is strategic on the transition to more sustainable patterns of production.

Strategies to intensify actions coordinated internally in the industrial sectors and with governments and civil society organizations are no less important. The dissemination of sustainable practices by means of the supply chain and incentives for companies to undertake the role of integrated management of the territories are powerful tools.

The sectorial volumes developed by industry associations are valuable contributions to addressing subjects such as sustainability and competitiveness of domestic industry. One of the most representative results of this process will certainly be the strengthening of structured programs of action with a focus on promoting sustainability in the production. These initiatives will act as raw materials so that the industries involved and

CNI are able to systematically publish documents presenting the national industry´s developments towards the goals of sustainable production.

The documents presented here are intended to be a valuable contribution to enhance the debate on sustainability. Each of the sectorial associations is to be congratulated for their efforts.

Robson Braga de Andrade
President of the National Confederation of Industry – Brazil

SECTORIAL PRESENTATION

The focus of sustainability is clearly present in the activities performed by the machinery and equipment sector. The Rio+20 Conference is an opportunity to show the actions performed by the sector on behalf of environmental, economic and social sustainability.

Representing the sector, the Brazilian Association of Machinery & Equipment (Abimaq) elaborated this document, which portrays the capital goods sector, for presentation in the Rio+20 Conference, with the aim of highlighting the activities performed by the sector and, at the same time, encouraging the practice of more actions aiming at green economy.

Abimaq is proud to take part in the Rio+20 Conference and believes this is an exceptional opportunity for union of all sectors of the industry and awareness of the society toward the construction of a better world for future generations.

Luiz Aubert Neto
President of the Brazilian Association
of Machinery & Equipment Industry

1 INTRODUCTION

1.1 Machines for green economy

The Brazilian Association of Machinery & Equipment Industry (Abimaq – www.abimaq.org.br) believes in the positive results that can be obtained from the Rio+20 Conference. The challenge proposed is not just to accompany what was done in Rio 92 in favor of sustainability, but rather to locate green economy in the context of sustainable development and eradication of poverty and also to discuss the institutional structure for sustainable development, involving international organizations, governments, private sector and society. The machinery & equipment sector is ready to contribute actively to this new moment. The questions of Rio+20 are mostly present in the document *"A indústria de bens de capital em 2022"* [The capital goods industry in 2022], concluded and submitted in November 2007. In this work, the Association took as main reference a series of social indicators that must be attained by 2022, when Brazil will celebrate its 200th anniversary of its Independence.

The document is a project for Brazil. It presents a series of conditions in order to attain social and economic indicators that place the country among developed nations. It defines, as most desirable scenario for 2022, a developed, competitive country, with per capita income of more than 25 thousand dollars, made possible by the presence of a strong transformation industry, of a vigorous and competitive capital goods industry and of a consolidated domestic market.

This involves feasible goals. The study proposed that Brazil attain in 2022 the same Gini coefficient, which measures the distribution of income, that Argentina has today (below 49). Despite having reduced its Gini index in the last 16 years, Brazil still has the doubtful privilege of having an index greater than 50.

In Abimaq's view, the attainment of social indicators will only be possible if the country develops its industrial complex. There will only be a strong, competitive, developed, socially fair and environmentally-oriented Brazil if there is a strong, competitive transformation industry able to produce items of high added value that are ecoefficient and able to offer jobs of quality, with good remuneration and suitable working conditions for employees.

A new window of opportunity is opened with Rio+20. In view of the scarcity of natural resources, compromise of existing reserves, creation of environmental liabilities that may only be overcome in decades, it is imperative to direct development toward green economy. Specialists point to the need for a green new deal (promote to promote development according to what was developed in the United States in the 30s) at global scale. Within this new concept, investments in infrastructure and capital goods will be especially fundamental.

Effective realization of these investments will allow the attainment of two simultaneous objectives of developing countries. On one side, it recovers and boosts the economy. On the other, it meets the more urgent demands, in sectors like sanitation, energy, transport, civil construction, among others. There are, without doubt, countless demands to overcome.

A more evident example and that produces serious consequences to the health of the Brazilian population is the precarious situation of basic sanitation, since access to potable water is not available to 36 million inhabitants. More than half of the population (86 million) does not have collected sewage and 126 million does not have access to the sewage treatment service.

The lack of treated sewage causes several health problems. A study by Institute Trata Brasil reveals that were access to basic sanitation universal, the number of hospital admissions would be 25% less. The number of deaths due to problems caused by the lack of service would drop by 65%. The same survey shows that with each Real [Brazilian National currency] invested in sanitation, four reais are saved in the area of health.

If actually concretized, the investments in basic sanitation will produce two positive and simultaneous effects, related to health of the population and improvement in environmental quality. Treated sewage can be reused for other purposes other than human consumption – like washing of roads, industrial use and in cooling systems, thus reducing wastage and preserving water sources. Pipe water, sewage collection and treatment produce substantial improvements in quality of life and, as a result, in social indicators.

Social issues are also treated by Abimaq and by the machinery & equipment sector with all care. Always with the Brazilian industry and the country's future in mind, the entity created projects like "Entrepreneurial culture", aimed at educating children and youngsters and encouraging entrepreneurship. After all, it is through industry that a country is developed. Preparing youngsters, Brazil will have more entrepreneurs in the future, a stronger industry and a better country.

Abimaq is very close to the objectives of Rio+20 when talking of investments in Environmentally Sustainable Technologies (ESTs). The sector always seeks continuous improvement in the energy efficiency of machinery and equipment it produces and also of its own systems. This is vital in an highly competitive market. The consequence of this stance is that new generations of machines are always more effective than machines in operation in the market with regard to energy efficiency and use of other inputs.

In this segment, there is a potential market of great proportions, since the machines installed in the country have average age of more than 17 years. They are equipment from former generations, with low energy efficiency. Substituting this entire aged complex by state-of-the-art machines will require a redirecting of the country's investments in the coming years. There is the need to balance to some extent public expenditures and consumption of families to have surplus of resources that can be destined to the production of machines and equipment and areas of infrastructure.

Industry is the base of the economy. Developed countries always have an industrial sector with strong and developed capital goods. Thus the importance of investing in industry, especially in ecoefficient industry that, besides helping the country, preserves the environment.

In this context, it is fundamental to encourage the production of eco-efficient machines – which can be done through tax incentives. In the same line, the competitiveness of the industry and country as a whole presupposes complete exemption from productive investments. In an environment marked by the highest competition, it makes no sense to export taxes and endear investments. The taxes that fall on productive investments discourage the Brazilian entrepreneur. As a result, industries lose competitiveness, watch the reduction of their exports and substantial increase of imports.

There is also a simultaneous challenge. It is essential for an important part of investments in mechanical capital goods (for production of machinery and equipment) to be directed at the local market. Importation without rules and without obeying the country's law, including in the environmental area, is growing and represents an actual threat to the national industry and to the qualified jobs it generates.

It is in this wide context of industrial renewal, with focus on green economy and sustainable development, that the Rio+20 takes place. Abimaq wants to take part in this global effort, placing Brazil's mechanical capital asset sector at the service of eradicating poverty, of sustainable development and promotion of social equality.

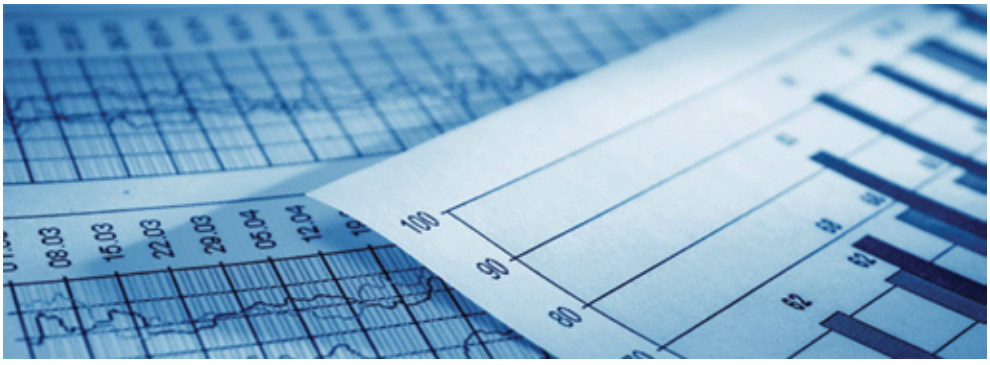
The machinery & equipment sector, represented by Abimaq, sees this scenario with optimism. There is much space for industrial growth, for the conduction of new business. There is space for an environmentally-oriented, technologically advanced and socially fair economy.

Abimaq includes the machinery, equipment industries and basic sanitation and environmental systems. Such companies have the latest technology to provide the public sector and the private sector in this segment – so vital to health and the environment. Private investments have been made. The public sector must now enter at once to overcome this terrible social and environmental illness.

2 ECONOMIC PANORAMA – SECTOR PROFILE

2.1 General profile – The industry's industry

Ci Founded in 1975, under the auspices of Sindimaq, created in turn in 1937, and which will complete 75 years in 2012, Abimaq unites 1,500 associates, from 27 industrial sectors. They are part of a world of 4,500 mechanical capital goods industries set up in the country, representing 33% of the sector.



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Out of this total, 60% comprises small enterprises, with annual turnover of up to R$ 10.5 million. While 30% comprises medium-sized enterprises, with annual turnover between R$ 10.5 million and R$ 60 million. The big companies make up 10% of the total and have turnover of more than R$ 60 million. The sector generates 260 thousand direct jobs, with average remuneration of over 2,500 reais.

The turnover for the sector in 2011 was about R$ 80 billion, which represents 2.7% of the GDP. Exports reached R$ 20 billion (or 11.9 billion dollars), which represents 25% of the sector's total turnover. The average education of employees in the capital goods industry is nine years – against six years of the national average.

The sector is a type of "industry of industries". It provides machinery and equipment for a vast range of industrial sectors. It is present in the areas of oil & gas, steel, bio-energy, plastic, chemicals, press, pulp & paper, wood, textile, basic and environmental sanitation, cement and mining, food, pharmaceutics and industrial refrigeration, among others.

It produces pumps and motor pumps, motors and generators, industrial valves, agricultural machinery and implements, irrigation equipment, road machines, designs and heavy equipment, furnaces and industrial kilns, naval and offshore equipment, tools and modeling, gymnastics equipment, mechanical transmissions, packing, hydraulic, pneumatic equipment and industrial automation, equipment for moving and storage of materials, systems and machinery for the compressed air and gas industry.

It also manufactures machines, equipment and instruments for quality control, testing and measurements. It produces machine-tools for other sectors of the industry. Such products are machines to manufacture other machines, whose final result may be the component of a car or a part integrated to other systems.

The sector is marked by certain invisibility to the eyes of society. Ordinary people know the final products to which they have access and their manufacturers. They do not know that such products are part of a complex chain of production upstream.

2.2 Historical retrospective – From past to present

The performance of the mechanical capital goods sector (and that of the capital goods in general) depends, in the country, on two variables located outside factories: the investment rate and the so-called "Brazil Cost". The first, the investment rate, is technically designated by the expression "Gross Fixed Capital Formation" (GFCF). For Brazil to have a thriving transformation industry and be able to renew its manufacturing complex, the investment rate must reach a level close to 25% of the GDP, as recognized by analysts of contemporary economic history.

The Brasil Maior Program, launched in 2011 by the Federal Government, foresees an investment rate of 22.4% of the GDP in 2014 – an index that the country is still far from attaining, since the GFCF remained at about 18.5% of the GDP in 2011. In Abimaq's view, this level of investment hardly allows Brazil to support a growth of about 3.5% per annum. Higher rates will require increase in savings and investments.

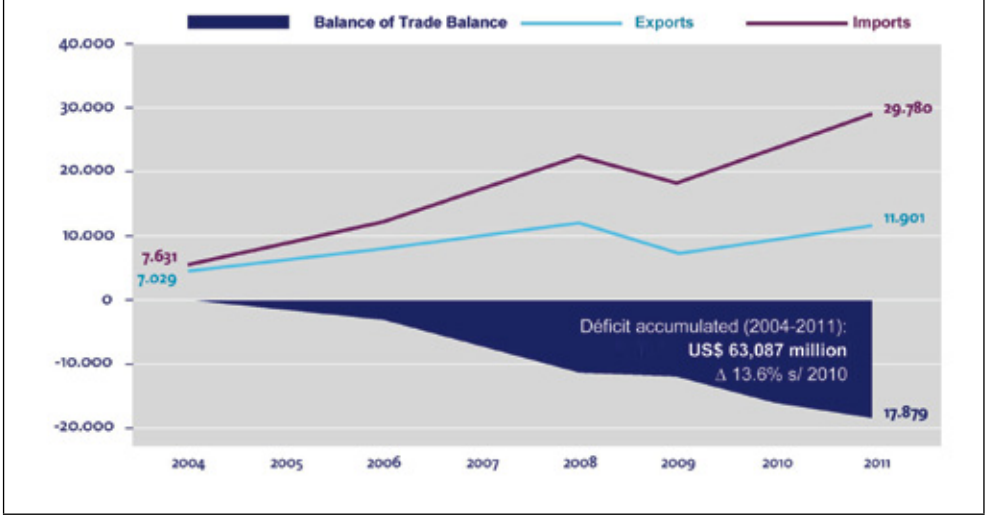
There are three possible sources for the investments: external savings, public savings and/or private savings. Resorting to external savings created terrible problems in the recent past and should not be used by the society and by the country. The way that remains is that of reducing public expenditures and/or consumption of families. According to Abimaq, annual growth rates close to 5% will require an investment rate of 23% to 24% of the GDP.

In a retrospective flight, note that Brazil left an investment rate of 24% of the GDP, in 1980, to a level of 17%, in 2007. This prevented renewal and modernization of the Brazilian industrial complex. This fact, combined with other phenomena, like valuation of the Real as of 1995, gave rise to a deindustrialization process in the country, in various segments of the industry, as shown in the document "Abimaq 2022".

The transformation industry, which represented 36% of the GDP, shrank to half, answering for 18% of the GDP in 2006. The consequence for the national mechanical capital goods industry (BCMs) was even more serious. Brazil, which was the 5th biggest world producer in 1980, fell to the 14th position in 2011. China, Korea, Thailand and Malaysia did not produce, together in 1980, more than 15% of the national production. Today, the situation is different. Brazil does not produce 15% of what these four Asian nations produce.

Imports did not stop growing. They totaled 7.6 billion dollars in 2004 – and grew almost four times, reaching 31.5 billion last year. According to Abimaq, in addition to the very low level of investments in GFCF, the loss of competitiveness of the industry is caused by factors that transcend the borders of factories.

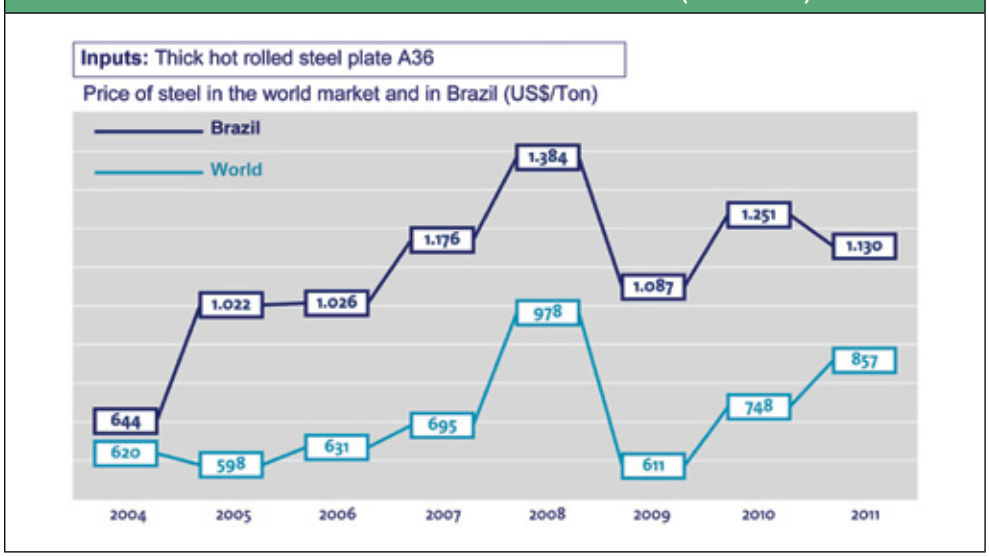
GRAPH 1. CAPITAL GOODS BALANCE OF TRADE (US$ MILLION FOB)



Source: DCEE – Department of Competitiveness and Economic Statistics.

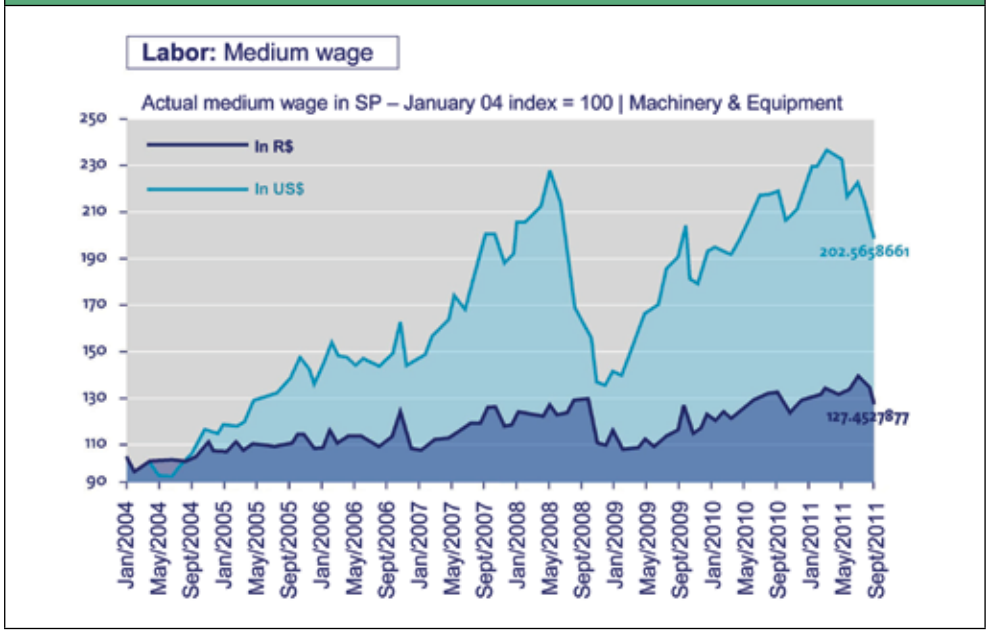
To produce mechanical capital assets in Brazil is 43% more expensive than producing in the United States and in Germany, as shown by the study "Impact of the Brazil Cost", widely disseminated by Abimaq in March 2010. Among the components most highlighted in the Brazil Cost are social and labor charges, costs of logistics, interests and price of inputs. Also add to this set of factors the overvaluation of the Brazilian currency against the dollar. The Brazilian real was valorized by 45% between 2005 and 2011, according to BIS (Bank for International Settlements).

GRAPH 2. MAIN FACTORS OF COSTS – INPUTS (2004-2011)



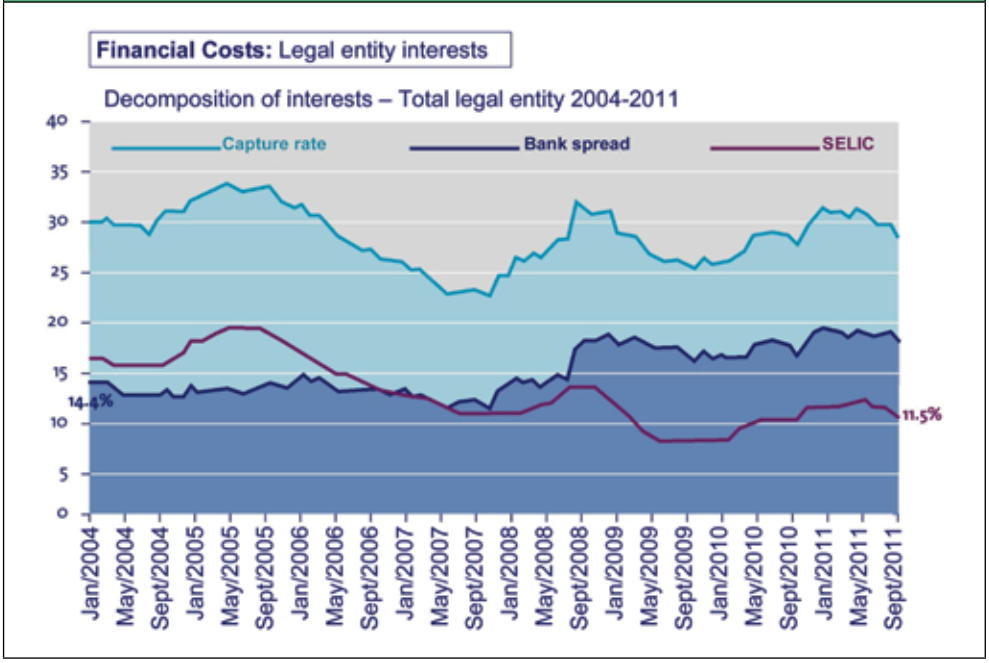
Source: www.crugroup.com, Meps & Deee/Abimaq (Survey by Sampling). Elaborated by: Deee/Abimaq.

GRAPH 3. MAIN FACTORS OF COSTS – LABOR (2004-2011)



Source: FIESP & CITA/ABIMAQ. Elaborated by: DEEE/ABIMAQ.

GRAPH 4. MAIN FACTORS OF COSTS – FINANCIAL COSTS (2004-2011)



Source: BACEN [Brazilian Central Bank]. Elaborated by: DEEE/ABIMAQ.

2.3 Challenges for development

The trajectory of the mechanical capital goods industry in the last decade can be reverted. Abimaq believes this. In the Abimaq 2022 study, the expectation is for the sector to gain sufficient force to be among the six or seven biggest countries that produce machinery & equipment in global terms. The possibility of reoccupying the fifth position does not seem feasible, in view of the leading role that countries like China and India have obtained in this segment.

The competitive capacity of the sector can be clearly shown when one takes into account the volume, quality and destination of exports, which represent a fourth of the annual turnover. About 46% of this volume has the Mercosur as destination. Another 19% is exported to Europe. The United States (US) answers for 18% of this total. The remaining percentage (14%) is distributed by tens of countries from various continents.

Besides overcoming the macroeconomic challenges (high interests and valorized exchange), Abimaq believes that the country will promote, over the coming years, all efforts to make the necessary investments, in the infrastructure and in the capital goods sector, environmentally oriented. After all, every developed country has a powerful and vibrant transformation industry. The industry is a good disseminator of new technologies and new processes, disseminator of good jobs. The industry contributes toward increased productivity of other industrial sectors.

The force of the Brazilian industry can be shown by the export of machinery and equipment to Germany and the United States, countries with a highly strong industrial sector and with very high technology. In 2011, almost 22% of Brazilian exports were destined to these two countries.

3 THE MACHINERY INDUSTRY AND SUSTAINABILITY

From the environmental point of view, the machinery and equipment industry is very friendly compared to other industrial sectors. The basic raw material is steel. Some special alloys are used, but the weight is in steel and its alloys, like stainless steel. Basically, the sector performs mechanical deformation of the steel, which is a process that pollutes less compared to other industrial processes, and machining, which is also clean because the compacted byproduct is also sent for recycling in electric furnaces to make new steel or to return to factories as raw material for the production of new machines and equipment.

It is important to distinguish consumption from utilization here. Consumption means transformation of the original material into other elements. An example is the burning of coal. When this occurs, there is consumption and it is transformed into carbon gas and water. With utilization, there is no transformation of the material. It is the case of water and of metals, which do not undergo transformation and can thus be recycled and reutilized – as is the case in the machinery & equipment industry.

Even with regard to energy consumption, in the case of plants from the sector, consumption represents about 3% of the turnover. The machinery & equipment sector is little intensive in energy consumption. In addition, it is always in search of new technologies to produce ecoefficient machines that increasingly meet technical and environmental requirements.

The sector's production process is by nature little impacting as it uses materials of easy environmental resolution. It is therefore easier to revert this small impact caused.

Despite this condition, the sector has been seeking to clearly identify opportunities for environmental improvements, reduction of greenhouse gas (GHG) emission, energy efficiency programs and continuous improvement of manufacturing.

3.1 Social action: “Entrepreneurial culture”

In the social field, the machinery & equipment sector has much to present. It is a largely formalized sector, with companies that follow environmental, labor and social security rules. The medium wages paid to employees are of R$ 2,500 – high for Brazilian standards. According to data from IBGE [Brazilian Geography & Statistics Institute], the medium wage of the Brazilian, in December 2011, was R$ 1,650.

There is however much to be developed in this area. Abimaq’s associated always arrive with new demands for courses, lectures and workshops. And the entity develops several programs in the field of social sustainability. An example of this is the Entrepreneurial Culture Program, presented below.

In a country where 67.5% of youngsters between 15 and 24 years of age are unemployed or underemployed, according to data from the ILO (International Labor Organization), the machinery & equipment industry mobilizes itself to encourage entrepreneurship. The IBGE estimates that, up to 2030, the Brazilian population should reach 230 million inhabitants. Therefore, 150 million jobs will be required.

An important alternative to generate jobs is the opening of new companies. The creation of jobs in the country depends greatly on the public sector. The City-halls are the biggest employers in 88% of Brazilian municipalities.

According to the Ministry of Labor, Brazil has one of the highest entrepreneurship rates worldwide. It is, however, the country with the lowest rate of closing of companies. Out of every ten businesses opened, in less than a year, only half remain in the market. This shows the Brazilian’s lack of preparation to manage a company. This is why the “Entrepreneurial Culture” was created, to encourage entrepreneurship at all levels of education, as of six years of age. The training of students will occur based on the 3 Pillars: – sustainable, healthy and solidary.

With the program, Abimaq intends to open new possibilities for generation of jobs and wealth for the country in future generations. The program is a partnership between Abimaq, Abrimpe (Brazilian Incentive to Business Projects,

Entrepreneurship & Education Association) and Unimep (Universidade Metodista de Piracicaba)/IEP (Instituto Educacional Piracicabano). The Entrepreneurial Culture will be available, free of charge, in Abrimpe, for public and private teaching institutions of all levels – Elementary I and II, High School, Technical and Tertiary.

The program is currently under phase of forming team, researches, development and training of professionals. In 2013, the pilot project will be implemented in Unimep and in Colégio Piracicabano. After the test phases, the aim is for the program to be present throughout Brazil, encouraging entrepreneurship and helping the country to grow.

3.2 The dream of decarbonizing the sector

3.2.1 Research with associates

The focus on sustainability was clearly assumed by Abimaq. The entity created the Environmental Responsibility Thematic Council, which unites important experts who establish the main lines of action, and also created the Environmental Responsibility Strategic Board, in charge of directing and implementing the initiatives in this area.

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RESPONSIBILITY

The dream of the Council and Board of Directors is to promote in the medium term decarbonization of the machinery & equipment sector through preventive processes and palliative and mitigating actions. It involves a dream that has already become a project.

With the aim of promoting a new management model to be adopted by associate companies and favoring reduction in carbon emission, Abimaq launched, in 2009, the Zero Carbon project.

One of the initiatives in this direction was the holding of the seminar "Responsible, sustainable and profitable: directions of the Brazilian industry in the era of decarbonization", in June 16, 2010.

Another step was the conduction of an online survey with Abimaq's associates. The aim was to identify the level of knowledge of entrepreneurs and executives of the theme of sustainability in its three dimensions – economic, social and environmental, and to identify their level of commitment to environmental causes.

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There were 182 responses – which corresponds to 13.5% of the total number of associates at the time. The survey showed that 46% of companies had their economic-financial information audited by third parties. With regard to the social balance, a third of the big companies, 11% of the medium-sized businesses and 5% of the small ones publish social balance. Out of those that do not publish, 31% consider the balance to be important but not a priority. Another 28% do not consider it important. While 22% had no formed opinion, and only 7.6% deem the social balance to be important and intend to implement it soon.

The survey showed that more than 90% of companies adopt policies that are aimed at minimizing environmental impact. A relevant data involves the ISO 14001 certificate or equivalent. More than 60% of big companies had already been certified, against 11% of medium and 8.4% of small industries.

With regard to the conditions required by companies in the relationship with their suppliers, the meeting of the labor legislation is required by 15% of them. Less than 12% of the companies surveyed demand fulfillment of environmental and social security legislations – which shows, in this context, a low commitment to sustainability.

The survey shows positive data. Out of the companies consulted, 81% frequently the materials for communication of their products to prevent undue purchase or use, health risk or production of environmental damages.

With regard to treatment processes and proper destination of residues, 77% of companies state that they provide their customers with information on possible environmental damages resulting from use of their products or services. Among the actions most cited is the presence of effluent treatment stations, selective disposal, recycling, contaminated waste collection, water treatment and conduction of socio-environmental responsibility courses in the delivery of their products to customers.

More than a third of companies promote improvements in infrastructure or in the place of usufruct of the community, using tax incentives for deduction or discounting of donations and sponsorships. More than half of the companies include analysis of their social and environmental work in the elaboration of their strategic planning.

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With regard to the development of actions directed toward socio-environmental responsibility, half of the companies answered that “at present, other priorities prevent this decision”. Out of those consulted, 24% would like to do so soon, while 22% do not have a formed opinion. The answers increasingly show that companies are still focused on their core business.

In the relationship with Abimaq, the associates heard in the survey want from the entity the “dissemination of experience of success”, “direction for development of social actions” and conduction of lectures, workshops and meetings. It is possible to notice here that the interest for the socio-environmental theme is growing and that the entrepreneur is open to listen, but still does not feel definitively committed to the theme.

3.2.2 Emission inventory

After the survey with associates, Abimaq started in 2011 the greenhouse gas (GHG) emission inventory process, with support of the Brazilian Carbon Bureau. The work presupposes that "every and any initiative related to GHG must be based on quantification, monitoring, report and verification of emissions, as well as capture and stock of GHG. The most suitable way of meeting these requirements is by conducting the Emission Inventory (in: "Abimaq GHG Emission Corporate Inventory").

Abimaq conducted the inventory of its headquarters, in São Paulo (SP) and sponsored a pilot project, of the plant RTS – Indústria e Comércio de Válvulas. The total emissions of the Abimaq headquarters in the period of one year was 77 tons of CO2 equivalent, due to use of electric power, refrigerant gases, solid residues and own fleet. The voluntary compensation of the GHG emissions was estimated through the planting of 553 trees. In the case of RTS – Indústria e Comércio de Válvulas, the corporate inventory showed that there was emission of 264 tons of CO2 equivalent, which could be compensated with the planting of 845 trees.

The inventory is now being made available to Abimaq associates. The initiative, however, had few adhesions to date. The entity believes that overcoming this problem involves the promotion of a work of awareness of companies. For them, the inventory will bring costs – of adhesion and, later, of reduction of GHG emissions. Abimaq has been working firmly to performs works in this line of awareness on the importance of such initiatives.

3.2.3 Lifecycle analysis

The inventory is part of a broader project for decarbonization of the machinery & equipment sector. One of the stages to be fulfilled is that of lifecycle analysis (LCA) and product lifecycle engineering (LCE). This analysis designs the chain of production based on the concept of lifecycle. From there, the impacts are identified and sustainable solutions are concretized through good environmental practices.

The first is a tool used to evaluate the potential environmental impacts of a product, service, process or activity in its entire lifecycle through quantification of the use of environmental resources and impacts. While LCE is an approach for decision making that seeks to identify improvements and reduce the negative environmental impacts of a good or service in all phases of its lifecycle.

Both processes are required to promote sustainability. And there is much to be done in this field, since majority of industrial processes still used today was developed in a time when there was abundant and cheap energy, when environmental liabilities were not properly known. One example involves the motors sold each year in Brazil: two thirds are from used equipment that undergo a recoiling or remanufacturing process.

Another important data involves motors. In global terms, the industry is responsible for about 35% of the energy consumption and has a potential of 25% for efficiency gains – 30% of this total being through more efficient motors. Abimaq's Environmental Responsibility Council has as main objectives the encouragement of:

- conduction of GHG emission inventory;
- decarbonizaton of the machinery & equipment industry;
- conduction of Solid Residue Policy inventory;
- other actions that may be linked to sustainability in the search for solutions referring to environmental themes, like energy deficiency and water footprints.

3.2.4 Topic summary

UNEP (United Nations Environment Programme) concluded in a recent study that the volume of investments required to make the world economy greener oscillates between 1 trillion and 2.5 trillion dollars per year – which is less than 10% of the global investment.

If US$ 1.3 trillion is invested per year or 2% of the world GDP to reallocate investments from the 'brown' economy to the green economy, UNEP's model indicates that with time the investment in green economy will improve economic performance in the long term and increase total wealth.

Following this model, it is possible to believe that, in the medium term, the consumerist, wasteful and inefficient economy of today will be gradually replaced by a green economy, that includes innovation, ecoefficiency, information and communication technology, with sustainable production and consumer standards.

Abimaq and industries from the machinery & equipment sector play an important role to fulfill this new moment experienced by the planet. The search for ecoefficiency and sustainability, besides being the only way to man's survival, is a new and exceptional opportunity for the takeoff of investments and resumption of the industry's role in the national economic scenario.

3.3 City of Energy, permanent showcase of renewable energy

Brazil is certainly a world reference due to having a clean energy matrix, based mostly on hydropower. But the country wants to continue ahead, promoting development in wide scale of other renewable energy sources. Spread through the country, the studies and pilot projects now have the opportunity to present in a single place – the City of Energy (www.cidadeenergia.com.br), a project by Abimaq that uses resources from the Federal Government, with support from Embrapa (Empresa Brasileira de Pesquisa Agropecuária), of the São Carlos City-hall (SP) and Universidade Federal de São Carlos.

It is a unique project in the country. The City of Energy will be a permanent exhibition park in São Carlos (SP). At a time when the work seeks sustainable solutions for industries, Brazil offers a unique environment, where it will be possible to know all the solutions used in the country in the area of clean and renewable energy.

Wind, photovoltaic energy, biomass and energy generated from hydrogen cells are ways of generating energy with little harm to the environment. These are some of the renewable forms of generation that must be present in the City of Energy, through giant mockups and pilot plants.

Energy generation from hydrogen cells, through water fractionation, is already used in Brazilian motors. Biomass is another point in which Brazil stands out, mainly using sugarcane and soy, which already have an organized chain. Wind energy can be used in places where there is no waterfall, where the wind speed exceeds 20 kilometers per hour, as in the Northeast of Brazil. Photovoltaic energy is already widely used in countries of Europe, like Germany, for instance.

To opt for one or another form of energy, one must analyze a series of factors, like the natural conditions of the location (wind, waterfalls, etc.). Also in this wise, the City of Energy will bring benefits to the public, to the extent in which it will provide a range of forms of energy production and experts to aid in the choice, pointing out the main aspects of each option.

City of Energy

In a total area of 140 hectares, 40 will be destined to the main area of the City of Energy. The design comprises:

a) 4 modules for covered exhibitions;

b) 1 module for conventions and congresses;

c) area for fair in modular lots;

d) area for permanent stands;

e) area for anchors or partners;

f) area for showcase of cultivars;

g) hotel;

h) administrative center;

i) access esplanade;

j) parking lot.

The central area of the exhibition pavilion will house the exhibition and congress center, as well as an esplanade for uncovered events, with capacity to receive a public of 10 thousand people. Together with this area, under the convention center, there will be the press center and restaurants.

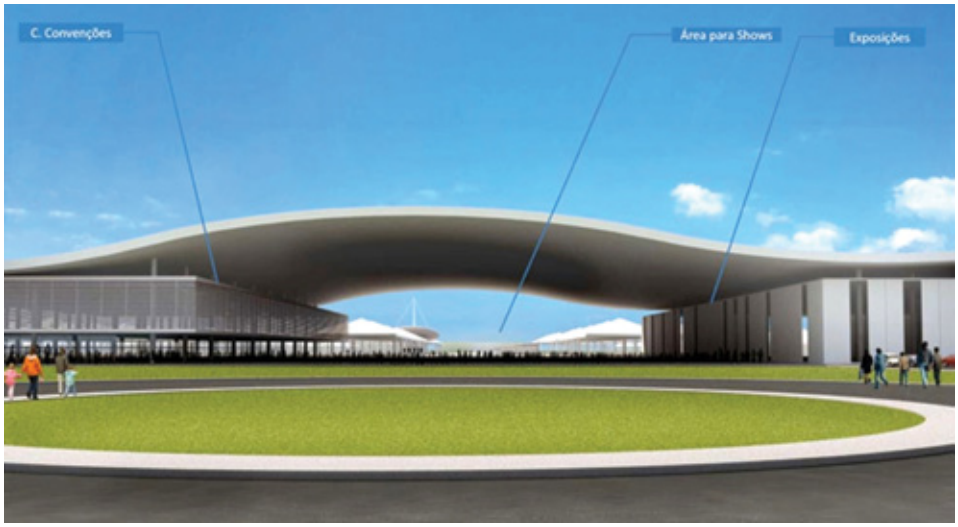
The covered exhibition area is divided into four modules of 12.5 thousand m^2 that can be integrated to house events with up to 50 thousand m^2. It is made up of sheds with height of 12 meters, cooled by solutions that allow comfort to visitors with minimum energy consumption. The roof of this area will have photovoltaic cells, so as to make the systems self-sufficient.

The convention halls will be set up in the central area of the assembly, in modules of 1,250 people, being able to harbor events with up to 5 thousand congressmen. They will be have all media and communication facilities. Rooms will be installed under this area for support meetings, restaurants and press area. All this area is served by docks and dumbwaiters, to allow fast assembly of events independent from the exhibitions.

An area was also reserved for exhibition of cultivars and species linked to the production of bioenergy. The lots can be used permanently throughout the year, working as a showcase to exhibit the growing species. Small stands are allowed to provide the visitors with comfort. The project also foresees facilities for visitors, like hotel services and administration center. It will also have a transport system to connect the project to São Carlos, airport, bus terminal and the main research centers of the region.

Various modalities of participation are offered to companies and entities interested in the project – from simple rental of lots for fairs, or rental of halls and pavilions, to permanent participation through stands or assignment for use of name.

FIGURE 1. ILLUSTRATIVE VIEW OF THE CITY OF ENERGY



Source: Abimaq

The investments for full conclusion of the City of Energy are estimated at R$ 400 million. The initial phase, which should be concluded in 10 years, foresees investments of R$ 116 million. The preliminary environmental licenses have already been granted. The paving of the seven-kilometer section connecting Guilherme Scatena highway to the vicinities of Washington Luiz highway and the campus of Universidade Federal de São Carlos are already in the bidding phase.

3.4 Sustainable Agrishow

Each year, ABIMAQ holds the Agrishow, International Agricultural Technology Fair in Action. The fair, in 2011, was attended by 765 exhibitors and over 146 thousand visitors. The business generated during the event totaled R$ 1.7 billion. The challenge is not to include in Agrishow's planning a socio-environmental responsibility policy. The initiative is in project phase. The fair's organization intends to implement part of the measures still in the event of 2012.

In 2012, with the planning of the exhibitors already in progress, the strategy is to guide them to adopt sustainable practices in all preparatory processes of the fair and, later, in the exhibition of products. The exhibitors, however, are not the only target of the project. There are also actions directed toward visitors.

The first phase contemplates the planning. For this, the exhibitors will receive a Sustainable Practice Manual with subjects like residue management, sustainable stands and energy efficiency. A cycle of lectures on wastage reduction will also be offered to exhibitors and collaborators, through videoconference.

During the event, some initiatives will encourage the adoption of sustainable practices. Sustainability cases of segments taking part in the fair will be presented. Visitors will receive the Socio-environmental Responsibility Primer containing directions on consumption, reduction, recycling and reutilization.

Agrishow will also have selective waste collection, shared transport – roadmap for transport of collaborators and exhibitors before, during and after the fair, collection of cell phone batteries and dry cells, devices that will show data on CO2 emission and the quantity of recyclable waste collected, store of ecosustainable souvenirs with motifs of the 2012 Agrishow, green corridor – demonstrations of green technologies and processes, and 100% recyclable stand.

At the end of Agrishow, a sustainability report will be elaborated, made available online. In addition, mitigating actions will be implemented, like neutralization of CO2 emitted, through the planting of seedlings in the surrounding area.

The sustainable Agrishow is an initiative by the President of the 2012 Agrishow, Mr. Maurílio Biagi Filho, together with the Environmental Responsibility Board of Abimaq, with the aim of showing the associates and society in general the importance of applying good environmental responsibility practices, including in a big exhibition fair and technological showcase of Brazilian agribusiness and, above all, prove that it is possible to take the concept of sustainability to one's day-to-day.

3.5 Sustainable equipment

The sugar & alcohol sector, in its production, generates a byproduct: vinasse. If processed through a biodigester, vinasse generates water, solute and methane gas. Machine manufacturing company, specialized in the alcohol sector and socio-environmentally responsible, developed a biodigester machine that transforms the residues generated.

The water is treated and reused in industrial activities. Intake of more water is thus prevented, preserving the environment and bringing savings to the company. The solute, which carries the organic matter, passes through a digestion process that generates a biofertilizing residue. This biofertilizer can be used by the company itself or event sold. And the methane gas is reutilized for energy.

4 CAPITAL GOODS FOR RENEWABLE ENERGIES

Abimaq and ABDI (Brazilian Association for Industrial Development) created in 2010 the project "Perspectives of sector technological development: capital goods industry for renewable energy".

Under coordination of Grupo de Indústria e Competitividade [Industry & Competitiveness Group] – GIC-IE/UFRJ and with collaboration of the Polytechnic School of UFRJ and Núcleo de Economia Industrial e da Tecnologia [Industrial Economy & Technology Center] – NEIT, of Unicamp, the aim is to evaluate the perspectives of technological development for the capital goods industry for renewable energy (IBKER), expected for a horizon of the next 15 years, aimed at aiding later initiatives in the elaboration of a sector technological agenda with suggestions of actions in industrial policy for the capital asset sector.

The project's focus is on equipment related to generation of electric power originated from the following renewable sources: wind, solar and photovoltaic and traditional, like biomass and PCH (small hydropower plants). The project's technical committee is made up of the following entities:

- Solar Energy Lab or UFRGS (Universidade Federal do Rio Grande do Sul);
- Solar Energy Technology Center of PUC-RS (Pontifícia Universidade Católica do Rio Grande do Sul);
- National Reference Center in Small Hydropower Plants of Unifei (Universidade Federal de Itajubá – MG);
- Center of Excellence in Thermopower & Distributed Generation of Unifei;
- Centro de Referência para Energia Solar e Eólica Sérgio de Salvo Brito [Sérgio de Salvo Brito Solar & Wind Energy Reference Center] – (Cresesb/Cepel);
- Lab of equipment and thermal processes of Coppe/UFRJ – Coppe – Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia [Alberto Luiz Coimbra Post-Graduation & Engineering Research Institute], of Universidade Federal do Rio de Janeiro (UFRJ).

The first results of this project were presented in the 4th edition of Abimaq Inova, with the theme “Energy: opportunities and technological challenges”, promoted by Instituto de Pesquisa e Desenvolvimento Tecnológico da Indústria de Máquinas e Equipamentos [Machinery & Equipment Industry Technological Research & Development Institute] (IPDMAQ) and by Abimaq, on November 8th, in the entity’s headquarters, in São Paulo.

4.1 Abimaq and renewable energy

In view of the growing demand for machinery and equipment for the bioenergy sector, Abimaq could not be left out of the big discussion on the subject. For this it created the Bioenergy Board, located in the region office of Ribeirão Preto, main industrial and strategic bioenergy center of the country.

Abimaq’s Bioenergy Board has the purpose of conducting studies and gathering sector data on bioenergy for the machinery & equipment sector. In addition, it is involved in initiatives for improvement of production and manufacture of machinery and equipment and development of new technologies.

5 THE MACHINERY AND EQUIPMENT INDUSTRY BEFORE THE WORLD

The machinery and equipment industry induces competitiveness, innovation and energy efficiency for the entire chain of production. It is what provides the foundation for other industries to produce their goods. For this reason, it is of utmost importance for the sector to be competitive, invest in technology and innovation so as to increasingly meet the demands of society and of the environment.

Brazilian industries are not lagging behind compared to industries of other countries. Brazil has state-of-the-art technology and uses it in the manufacture of state-of-the-art machinery and equipment. Brazilian machines have quality to be exported to the entire world. The country also exports to the United States and Germany, countries that historically have a strong machinery industry. In 2011, according to an Abimaq survey, 22% of Brazilian exports were destined to these two countries.

Brazilian exports, however, have been falling significantly. But this is not due to lack of qualification of Brazilian companies. Rather, it is due to factors external to the factory, like the Brazil Cost, the valorized exchange and excess interests. These factors produce another effect – they attract imports to the country. With the real valorized before the dollar, the purchase of machines from other countries has become a profitable activity. The country, today, imports many old machines as if they were new, that are no longer used in avant-garde countries. They are technologically outdated equipment and that often do not meet environmental and occupational safety requirements.

Brazil, however, does not have customs follow-up systems and legal and effective rules to prevent the entry of scrapped machinery and equipment. The result is that many imported products do not meet the environmental legislation and occupational safety standards, as is the case with products manufactured here.

Abimaq has been working, through various meetings with government agencies, to change this scenario. The entity and the sector hope not for the end of imports but rather for the end of imports that age the country's manufacturing complex even more or even, in some cases, place the lives of workers at risk and harm the environment.

It is important to note, however, that Brazil has very strong sectors, like oil & gas, which is a world reference with regard to machinery and equipment. Basic sanitation is another Brazilian sector with international strength, recognized for its high technology and innovations. In Brazil, however, there is still a lacuna when it comes to sanitation. This is one of the great challenges that the country must face.

5.1 Abimaq supporting exports

In view of the national macroeconomic scenario, which renders exports difficult, Abimaq, in partnership with APEX-Brasil (Brazilian Trade & Investment Promotion Agency), created the Brazil Machinery Solutions (BMS) program, aimed at promoting Brazilian export of machinery and equipment, in addition to strengthening Brazil's image as a manufacturer of mechanical capital assets, which is a sector already recognized as one of the biggest and foremost of the Brazilian industry.

Created in August 2010, the program currently has 130 participant companies and, despite the economic hardships faced by the Brazilian segment, the sector's participation has increased considerably in the program's actions.

Focusing on the markets of South Africa, Angola, Argentina, Colombia, Chile, Peru, Venezuela, Mexico, United States, India and Russia, in addition to Central America, BMS performs various actions to approach the Brazilian business community of such markets. The aim is to show the quality and differentials of Brazil's machines and equipment, which call attention not only for their quality, but also for their inventive capacity. The machines and equipment manufactured here meet the real demands of customers, adapting to the needs and particularities of each one.

With Brazil Machinery Solutions, Abimaq believes that its associates will be present in various countries, in an attempt to balance out the difficulties imposed by the valuation of the Real, high taxes and the Brazil Cost.

5.2 Basic and environmental sanitation

The World Health Organization indicates that each monetary unit invested in sanitation generates a saving of four units in the area of health. The great knot in Brazil is that public investments are too little to meet the precarious infrastructure. The sanitation sector points to the need for annual investments of R$ 11 billion. However, maintaining the current pace of investments in the area, the sanitation problems would only be solved in 110 years.

The 81 most populous cities in the country, with over 300 thousand inhabitants each, discharge each day almost 6 billion liters of sewage without any treatment, contaminating soils, rivers, water sources and beaches, with direct impacts on the health of the population and on the environment. Were basic sanitation a universalized service, there would be a reduction of 25% in admissions caused by lack of sanitation and the drop in the mortality rate would be 65%, according to data from Instituto Trata Brasil.

If investments are lacking, there is excess bureaucracy. The Bidding Law does not allow the public manager to take into account the technological quality of the solution proposed. The result is the contracting of equipment and systems that are not always the most suitable, since they aim only at the lowest price. This decision does not take into account the cost/benefit of the services offered and compromises the services to the population, which often ends up having a service of low technological quality. In the case of contracting of the private sector, this does not occur. The search for the best solution ends up prevailing in most cases.

With the Sanitation Law, a new window of opportunity was opened. All the country's municipalities will have up to 2014 to present their water use, sewage, residue and urban drainage plan to obtain resources from the Federal Government. Abimaq, through Sindesan (National Union of Basic & Environmental Sanitation Equipment Industries), has been seeking to make municipal authorities aware to actually elaborate and implement their sanitation plan.

If actually implemented, the investments in basic sanitation represent an exceptional boost in the socio-environmental field, with reflections on the entire society and for a very long time.

5.3 State-of-the-art technology at the service of bioenergy

The use of ethanol in substitution of gasoline reduces by up to 90% greenhouse gas (GHG) emissions. The production and use of ethanol reduce GHG emissions by about 50 million tons, in CO2 equivalent, for an annual consumption of 25 billion liters of ethanol. For each fossil unit spent during the ethanol production process, 9.3 units of renewable energy are generated. The relative efficiency in the generation of ethanol from sugarcane is considerable: 4.5 times better than the ethanol obtained from beetroot and from wheat and seven times better than that from corn.

Data from the Ministry of Mining & Energy (MME) indicate that 18% of the Brazilian energy matrix comes from biomass, especially that of sugarcane. It is a significant percentage compared to other countries worldwide, whose biomass energy production is about 10% of the energy matrix.

This special characteristic of the country's energy matrix is only possible by the presence of national machinery and equipment industries that are in the advanced border of the sector's technological development. There are about 500 direct supplier companies (of boiler works and other items) and 1,000 others that perform indirect supply.

Brazilian companies are world leaders in equipment, processes and plants. The equipment industry developed a comprehensive line of products, including complete plants, with own technology and minimum importation of components (nationalization close to 100%). The national equipment industry has an installed capacity for annual supply of about 50 new complete (turnkey) plants per year, generating an additional capacity of 8.6 billion of anhydrous ethanol.

The sugar-alcohol sector is the only sector in the country to master all the stages of the technology, involving the engineering, production and operation, both agricultural and industrial. The technology and process engineering design and develop basic engineering solutions and equipment engineering to define and specify solutions. The industries manufacture, install and assembly the plants, in addition to also performing posterior technical follow-up.

With regard to quality, the national equipment industry meets all national and international requirements. It supplies equipment and plants, meeting all systems and standards applied to the sector. The great challenge of the sector in the 21st century involves the concept of biorefineries.

Biorefinery is a in industrial plant that integrates the processes of biomass conversion to produce fuels, chemical products of high added value and energy. The main characteristic is the use of renewable raw material, which has impact on the reduction of pollutants.

In the sugar-alcohol industry, besides fuel alcohol and sugar, other products can be generated (electricity, chemicals). On becoming a biorefinery, the plant adds to the industrial center factories able to produce goods from any residue, increasing the potential to win over new markets with alcohol and sugarcane byproducts.

5.4 Oil & gas in the order of the day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With the reserves already existing added to the presalt layer reserves, Brazil will have to make use of this huge energy potential, despite the effects related to emission of greenhouse gases (GHG). The role of technology, machinery and equipment is to reduce as much as possible GHG emission through use of state-of-the-art resources.

Present in Abimaq, the industries that supply the oil & gas area are ready for the new moment that arises. New business opportunities have been opened. The companies are very competitive, supplying to giants from the sector, like Petrobras, whose requirements are very high with regard to equipment quality and environmental & safety.

The companies set up in the country have important differentials in relation to competitors from other regions. An example of this occurs in submarine engineering, in which the Brazilian industry has equipment and systems that are very well accepted by contracting parties. One of the big buyers of Brazilian machinery and equipment in this area is Petrobras.

Abimaq's work in this area has been that of delivering to the associate information on what takes place in the market – which are the next purchases, what are the technical characteristics of the products requested. The entity also seeks to encourage associate companies to take part in these bidding processes. Many of them fail to take part in this market due to being unaware.

In the same vein, Abimaq seeks to always encourage the production of local content and mobilize associates to take part in technical events in Brazil and abroad.

6 INVESTMENTS OF R$ 3.3 TRILLION

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Data from the BNDES (Brazilian Economic & Social Development Bank) indicate that the investments to be made in Brazil between 2011 and 2014 will be in the order of R$ 3.3 trillion. Out of this total, the machinery and equipment sector should receive about R$ 268 billion in investments. Although below that desired for the country to grow by more than 5% per annum, it is without doubt a significant volume of resources.

With Rio+20, a new challenge may arise: how to direct these investments from the premises of sustainability? How to use the EST (environmentally sustainable technologies)? The ESTs result from knowledge, techniques, methods, experiments and equipment that use natural resources sustainably and that allow proper disposal of industrial waste, so as to not to degrade the environment.

The concept of environmental technology is wide enough to include technologies that were not designed with specifically environmental focus, but that can have positive impacts in the environmental field. There are many examples, like intelligent factory management systems and nanotechnology.

The national machinery and equipment industry unites plants that are in the forefront of technological development, thus being able to take part in this new moment, so as to contribute decisively toward green economy and sustainable development.

There is therefore the need for government instances to approach the society and the production & industrial sector. The perspectives of green economy will be much more promising once the old structural hindrances involving the Brazil Cost, the valorized exchange and high interests have been overcome.

In a country with so many social needs, one cannot forget the social responsibility of each company set up here. Social inclusion, education and health programs are also part of the construction of a sustainable country. Abimaq and the Brazilian machinery and equipment industry will do their part for us to have a fairer country, with good environmental practices, that is economically strong and respected worldwide.

7 ECONOMIC & SOCIO-ENVIRONMENTAL REGULATIONS THAT AFFECT THE MACHINERY & EQUIPMENT SECTOR

7.1 International agreements and regulatory aspects

- GHG Protocol emission inventory methodology, developed by the World Resources Institute (WRI) and by the World Business Council for Sustainable Development (WBCSD).

7.2 National regulatory instruments

- *Instituto Chico Mendes de Conservação da Biodiversidade [Chico Mendes Biodiversity Preservation Institute] (ICMBio) Regulatory Instruction nº 17, dated August 15, 2011* – Regulates administrative procedures for the signing of commitment terms in compliance with environmental compensation obligations directed toward federal conversation units, before the world of the requirement established in article 36, of Law nº 9.985, dated July 18, 2000, for support to the implementation and maintenance of the conversation unit in cases of environmental licensing of significant environmental impact.

- *Instrução normativa do Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis [Brazilian Institute of Environment and Renewable Natural Resources] (Ibama) Regulatory Instruction nº 7, dated July 7, 2011* – The following must be registered in the Federal Technical Register of Potentially Polluting Activities or Users of Environmental Resources: natural or legal entities dedicated to potentially polluting activities and/or extraction, production, transport and sale of products that are potentially dangerous to the environment, as well as products and byproducts of the fauna and flora, and other activities liable to control by Ibama and state and municipal environmental agencies.

7.3 Legislation and regulatory instruments – mandatory or voluntary

- *Resolução da Agência Nacional do Petróleo [Resolution of the National Petroleum Agency] (ANP) nº 42, dated August 18* – Establishes the requirements for granting of authorizations to construct and operate installation of automotive liquid fuels, aviation fuels, solvents, basic and finished lubricating oils, LPG, fuel oil, illuminating kerosene and asphalts to be granted to the distributor, transporter-dealer-retailer, producer of finished lubricating oils, collector of lubricating or contaminated oil and the refiner of used or contaminated lubricating oil, as well as change of ownership of the authorization and certification of space assignment contracts.

- *Resolução do Conselho Nacional de Meio Ambiente [Resolution of the National Waterway Transport Agency] (ANTAQ) nº 2190, dated July 28, 2011* – Approves the standard to discipline the provisioning of services for removal of residues from vessels.

- *Resolução do Conselho Nacional de Meio Ambiente [Resolution of the National Environment Council] (Conama) nº 433, dated July 13, 2011* – Provides on the inclusion in the Program for Control of Air Pollution by Automotive Vehicles (Proconve) and establishes maximum limits of noise emission for new agricultural and road machines.

- *Resolução da Secretaria Estadual do Meio Ambiente [Resolution of the State Environmental Secretariat] (SMA) nº 38, dated August 2, 2011* – Establishes the list of residue generating products of significant environmental impact, for the purposes set forth in article 19, of State Decree no. 54.645, dated 08/05/2009, which regulates State Law nº 12,300, dated 03/16/2006, and gives correlated provisions.

- *Resolução Conselho Nacional de Meio Ambiente [Resolution of the National Environment Council] (Conama) nº 429, dated February 28, 2011* – Provides on the methodology for recovery of Permanent Preservation Areas (PPAs).

- *Resolução Conama [Conama Resolution nº 430/2011* – Provides on the conditions and standards for discharge of effluents, complements and amends Resolution nº 357, dated March 17, 2005, of the National Environment Council (Conama). Legislation date: 05/13/2011.

- *Joint ordinance nº 325, dated August 19, 2011* – Establishes regime for cooperation to develop activities related to the Rural Environmental Register, National Register of Preservation Units and Greenhouse Gas Emission Monitoring & Control.

- *Law nº 10.165, dated December 27, 2000* – Amends Law nº 6.938, dated August 31, 1981, which provides on the National Environmental Policy, its purposes and formulation and application mechanisms, and gives other provisions.

- *Law nº 12.305, dated August 2, 2010* – Institutes the National Solid Residue Policy; amends Law nº 9.605, dated February 12, 1998; and gives other provisions. Legislation date: 08/02/2010 – Published in the Federal Official Gazette (DOU): 08/03/2010.

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