Electra
we can do it

This report was prepared as follow-up to, among others, the Commission Communication "Implementing the Community Lisbon programme: A Policy Framework to Strengthen EU Manufacturing – towards a more integrated approach for Industrial Policy" – COM(2005) 474 final of 5.10.2005. It focuses on developing an industrial policy framework for growth and jobs in the electrical and electronics industries. It also provides industry's response to a number of policy issues in the EU that affect the electrical and electronics engineering sector.

The Communication of 2005 identified the electrical and electronics engineering industry as an important sector in manufacturing which merits a policy dialogue analysing future strengths and weaknesses and anticipating how any weaknesses could be addressed in the longer term.

The Electra report was written by a team of experts from the electrical and electronics industry, CENELEC, the European Commission and the European Metalworkers' Federation under the chairmanship of Prof. Edward G. Krubasik, former President of Orgalime, and Günter Verheugen, Vice-President of the European Commission. Staff of the Enterprise and Industry Directorate-General of the European Commission participated in the work, but the report does not necessarily reflect the opinion or position of the European Commission.

This report, its annexes and other related material are available on-line:
http://ec.europa.eu/enterprise/electr_equipment/electra.htm

A great deal of additional information on the EU and its industrial and enterprise policy is available on the internet. It can be accessed and used through the EUROPA server (http://ec.europa.eu/enterprise).

The Electra team under the chairmanship of Prof. Edward G. Krubasik, former President of Orgalime, and Günter Verheugen, Vice-President of the European Commission.

Preface by the Joint Electra Chairmen

Manufacturing is Europe's economic backbone. It has been in the past, it is today and it will be in the future.

Today we are living in a world where distances are less and less relevant, and production of industrial and consumer goods and their product markets no longer require geographical closeness. Moreover, technological know-how now easily transgresses borders and quickly spreads across and between economies. The result is fierce global competition.

Europe is part of this competitive environment. As a matter of fact it has been a main driver and beneficiary of globalisation and it should and will continue to do so. Consequently, our focus has to be on maintaining and strengthening industrial competitiveness across the board, using the most comprehensive approach.

The European Commission has had this focus for a long time in the context of its Lisbon agenda for Growth and Employment, and it added a very targeted sectoral industrial policy approach through its 2005 Communication "Implementing the Community Lisbon programme: A Policy Framework to Strengthen EU Manufacturing – towards a more integrated approach for Industrial Policy". Electra is a recent addition to the European Commission's sectoral policy dialogues with industry. Generating continuously higher growth in the electrical and electronic industries is the goal of this initiative.

Electra addresses one of Europe's most important manufacturing sectors. Electrical and electronic engineering in the EU amounted in 2006 to a turnover of nearly 320 billion Euro and an employment of some 2.8 million people in more than 18,000 companies. Even if this sector has shown impressive growth rates in the past years, it has enormous potential if the EU wants to achieve the significantly higher world growth rate in this sector, and it holds the key to mastering mankind's most pressing challenges.

These challenges, which always offer new opportunities, do not come from globalisation only. They come mainly from stimulating more innovation and investment in Europe. They also stem from the fact that our industrial culture has reached the limits of sustainability in many aspects.

The effects of the earth's changing climate are already clearly visible and we need to find many new answers and practical solutions.

We are extremely grateful for the dynamism with which the Electra participants have tackled the issues arising from those challenges. The Electra report is comprehensive in analysing three key areas that require the full and urgent attention of policy makers, industry, stakeholders and the general public: improving energy efficiency, creating and supporting future lead markets for innovation and designing a regulatory framework that is both efficient and effective. It is obvious that a strong synergy between these areas exists and Electra is an important initiative to realise this synergy in the best possible way.

The Electra report contains serious and detailed recommendations for each of these key areas, addressed to different stakeholders who will need to interpret them in their specific context – industry by looking at the economic bottom line and the European Commission and the EU Member States by addressing policy issues within their respective mandates.

The Electra participants managed perfectly well to formulate and adequately address their recommendations and therefore produce this visionary report.

It is now up to all of us to reflect on the findings of Electra and move to operational conclusions. The challenges may be impressive, but, indeed, *We Can Do It.*

Prof. Edward G. Krubasik

Günter Verheugen

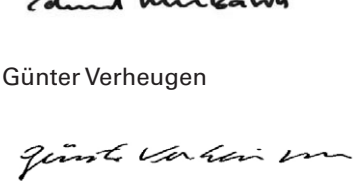

Table of contents

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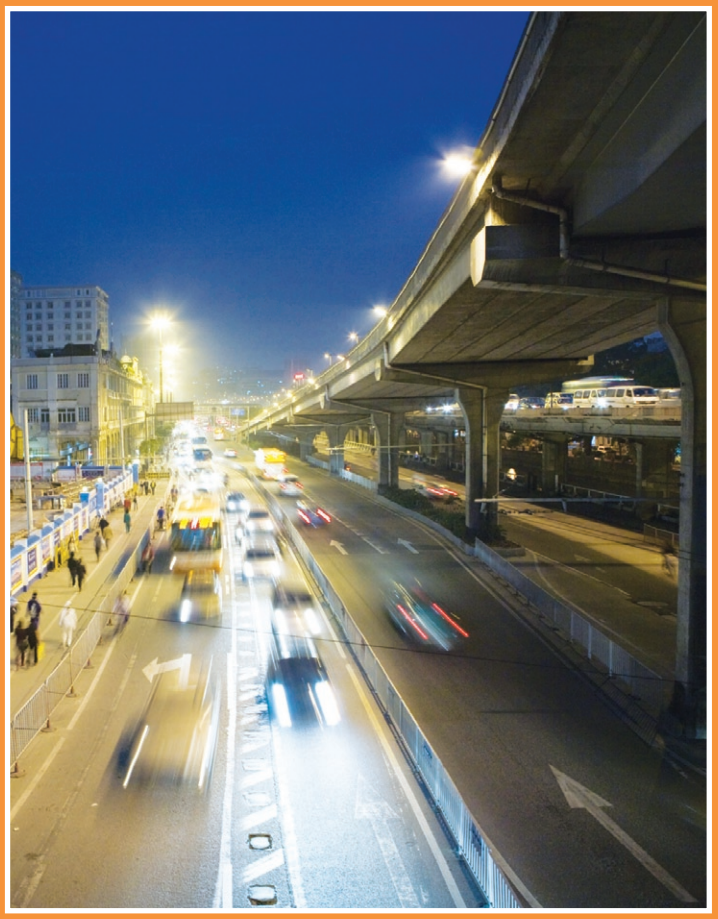


THE RIGHT CONDITIONS

Chapter 1:
Electra – Executive summary

1.1 Introduction

This report, the outcome of the work on Electra launched in July 2007, aims to focus on:

- The electrical and electronic sector's present and long-term competitive outlook in a globalising world.
- Measures to promote growth and jobs for the industry in the EU, so as to rise well above the industry's traditional 4% per year growth in output and to enhance its competitiveness to get closer to the significantly higher global sector growth rate.
- Measures stimulating significant additional investment in key customer sectors.

The three main chapters focus on three core subjects, which are analysed and give rise to policy recommendations:

- Energy efficiency and CO_2 reduction as drivers of innovation which concentrates on the technologies and innovations produced by the industry contributing to energy efficiency.
- How to generate more growth in key European electrical engineering sectors: this includes a review of the potential future lead customer markets for the industry.
- The internal and export markets of the industry which looks at the challenges in the area of the framework conditions in the EU, as well as in the area of regulation and standards in the internal market and on export markets and policy.

Detailed examples of application and further details on policy recommendations are given in the annexes which can be found on the following web site: http://ec.europa.eu/enterprise/electr_equipment/electra.htm.

1.2 Scope of Electra

The scope of Electra covers a broad range of electrical and electronic products, as well as equipment and systems, for example: household appliances, electromedical equipment, but also cables, wires and lighting equipment, which are described in detail in the statistical annex. The products of the industry are categorised by the OECD as of medium high to high technology.

Within the EU, Electra plays a crucial and significant role. On the one hand it is the key driver of product and process innovation, as well as the most important supplier of high-technology inputs to other industry sectors such as mechanical engineering, transport means, health, chemicals or ICT. On the other hand it has a huge potential for growth, especially in light of the present focus on the necessity of more energy efficiency due to the ongoing climate change.

While detailed statistics exist for the hardware market of the industry, the EU's competitiveness relies increasingly on the simultaneous provision of software and services which it is conservatively estimated accounts today for a further 25% of the output of the industry.

1.3 Industry output and trade in the internal EU market and internationally

Even setting software and service aside, the electrical and electronics industry (as defined in Electra's scope) is one of the most important industries in the world. Together with ICT, it forms the largest product market: worldwide Electra alone accounts for more than €1.5 trillion of production value. Of this nearly 90% originates from four regions: China (30%), the EU (21%), the U.S.A. (19%) and Japan (19%).

In all these regions the sector is a major manufacturing employer and its share of total manufacturing employment is high: 8% in the EU and in the U.S.A., 12% in Japan and China. The sector's share of total manufacturing value added is even higher.

Electronic components have developed to become the most important sub-branch in the U.S.A., Japan and China. In the EU, while it is strategic to maintain competence in developing and manufacturing electronic components, there is a strong focus on automation (which tops production output) and on energy equipment.

In the U.S.A. and the EU consumption is higher than production. In Japan and China the opposite is true. While China is already the largest producer in the industry, it still has enormous potential to increase productivity and will thus, in the future, become an even more serious challenge to the EU.

While trade on world markets between the "big four" reaches some €223 billion per year, trade in the EU's internal market also plays an important role with the ratio of intra versus extra trade being higher than 3:2.

1.4 Competitiveness challenges

Though Electra addresses one of the most important industries in each of the four major producing regions, and despite the high potential that the industry has in the EU, there are also severe challenges to cope with in the EU due to the tough competition from the U.S.A., China and Japan. This report is focussed on the EU demand growth challenge. It does not propose to analyse in depth the reasons for these other challenges. It is worth highlighting that:

- Employment in relation to production is comparatively high in the EU. In the U.S.A. and Japan, there are around one million employees and output is €290 and €285 billion respectively. In the EU for only a slightly higher output (€320 billion), the number is 2.8 million. The EU therefore faces a "productivity challenge", which is largely due to fewer annual working hours and to its product mix.
- In the U.S.A. value added is 63% of production, which is much more than in the EU (45%).
- R&D expenditures account for 24% and 17% of value added in Japan and the U.S.A., respectively. In the EU the ratio is only 11%.

1.5 Conclusions of the report

After analysing the challenges facing the Electra industry in the EU, we conclude that "We can do it". There is still considerable potential in the industry for growth and employment through higher investment and innovation in key customer markets in the EU and for keeping the industry's international leadership in many areas, in so far as policymakers are prepared to complement the industry's drive through the application of supportive policies in the EU and Member States. The main policies in question are the Jobs and Growth Strategy, Europe's Climate Change policy and the Lead Markets Initiatives.

1.6 20 key recommendations for growth and investment to 2020 and beyond

From the many recommendations listed throughout the report and in the annexes we outline hereunder our 20 key recommendations for 2020 and beyond which will have the most impact.

Our recommendations:

1. The EU should refocus its policies more on developing growth and jobs through its programme for CO_2 reduction, including developing incentive schemes and policies other than the Emission Trading Schemes (ETS) to mobilise the economically attractive investment potential in the buildings, industry and other sectors. (European Commission / Member States)
2. Bringing about the perception that energy efficiency must be tackled everywhere, a massive information and education campaign aiming at raising the general awareness of all actors – architects, contractors, and the general public – must be launched. (Member States / industry)
3. Regulation must continue to support energy efficiency: in buildings and homes, to include the active energy part, in products and systems by progressively introducing appropriate minimum energy efficiency requirements, which evolve over time. (European Commission / standardisation organisations / industry)
4. Ensure the leadership of public authorities with ambitious and visible investment plans in public infrastructures and buildings using where appropriate public private financing to drive the investments. (Member States)
5. Foster R&D programmes, define technology roadmaps and an innovation policy to support early demonstration projects and maintain or create lead customer markets to foster early development and application of new technologies in Europe first: for instance in e-health, automation, energy efficiency, renewable energy, mega-cities. (European Commission / Member States / industry)
6. Develop benchmarking and the sharing of good practices, introducing Europe wide harmonised performance criteria or metrics for measuring energy efficiency for different sectors (energy passports / ratings for buildings, energy labels for consumer products). (European Commission / industry)

7. Set overall energy efficiency targets for each Member State and enforce national binding roadmaps and/or action plans (e.g. the National Energy Efficiency Action Plans – NEEAPs under the Energy Services Directive) independently of the current energy mix, based on an exhaustive inventory of the current local environment and stimulating smart metering and intelligent power management. (European Commission)
8. Encourage investment and renovation with energy efficient products and systems, fostering replacement of obsolete, energy inefficient products, closing down and replacing the least efficient installations and ensuring proper maintenance through launching long term fiscal policies and financial incentive plans adapted to each sector. (Member States)
9. Modernise high-tech infrastructures in the EU, through fostering the development of EU lead customer markets, based on society trends and demand, improving the competitive environment and attracting both public and private funding and investment. (European Commission / Member States)
10. Initiate a limited number of lighthouse projects, similar to Galileo, such as the digital EU identity card and passport, EU electronic payment technology, an EU wide high voltage direct current-grid, cross-EU high speed transport lines, EU driven e-health and e-government and security solutions. (European Commission / Member States)
11. Ensure stable and predictable regulatory framework conditions, especially at the levels of regulatory certainty and consistency for incentives and return on investment, to promote sustainable investment by customers in the energy and energy infrastructure markets. (European Commission / Member States)
12. Set up a regulatory framework through smart regulation stimulating investments, in for example new digital media (Digital Rights Management systems, copy protection...) and allocate frequencies for mobile broadcasting and high definition television in Europe. (European Commission, World Radio Conference WRC)
13. Aim at achieving that all EU countries should send at least 50% of students through tertiary education and to attract at least 25% of tertiary education students into technical, engineering and science education. (Member States / industry)
14. With large investments needed in the EU to foster the integration of Europe, generate more growth through the use of regional funds to build high-tech infrastructure, by stimulating public-private-partnerships, and by taking energy efficiency into account in public procurement through the use of voluntary and incentivised lead standards. (Member States / industry)
15. Develop access to capital in the EU through the progressive capitalisation of pension funds, facilitating access to private capital and in particular venture capital. (European Commission / Member States)
16. Ensure that the New Legislative Framework brought about by the marketing of goods package, recently adopted by the EU institutions, effectively leads to a real improvement in market surveillance in the EU to ensure safe products and fair competition. (Member States / European Commission)
17. Achieve a far greater consistency and coherence of EU environmental and eco design regulation so as not to unnecessarily duplicate regulation, which only penalises manufacturers in the EU. (European Commission / Member States)
18. Motivate our trading partners to align their own legislation, particularly environmental, to the EU's as far as possible and to apply a lighter certification regime in particular for low risk products. (European Commission)
19. Improve patent regulation in the EU with a balanced and affordable patent system and, in the context of international trade, make the respect of Intellectual Property Rights (IPRs) a key element to trade discussions and agreements. (European Commission)
20. Develop regional clusters in order to foster cooperation between science and industry. Start an EU-wide cluster benchmarking initiative. Transfer experience and best practise sharing between clusters. Use the European Institute of Technology (EIT) as the brainpower-network for Europe's future. (European Commission / Member States / industry)


Europe has set its own target to cut CO_2 emissions by 20% by 2020

Chapter 2: Energy efficiency & CO_2 reduction as drivers of innovation

2.1 Introduction

Limiting global warming by reducing greenhouse gas emissions is a global target set at the Earth Summit in Kyoto in 1997; within this context, Europe has set its own target to cut CO_2 emissions by 20% by the year 2020; this target should be achieved thanks, among other to a 20% increase in energy efficiency and the introduction of 20% renewables in overall EU energy consumption.

The electrical and electronic engineering industry has a major contribution to play to achieve these targets.

The present findings are based on the knowledge and understanding of the participants, but also refer to the numerous studies and reports which demonstrate the potential for energy efficiency and propose a global mapping of greenhouse gas abatement opportunities: reducing greenhouse gases must be achieved through a balance of ecological and economic criteria, including a cost-benefit analysis. The McKinsey studies of cost and potentials of greenhouse gas abatement suggest findings to tackle the issue. Our proposals aim to take into account the notion of marginal cost abatement curves and therefore to propose measures ranked in order to reflect how profitable or economically acceptable these measures are in relation with the cost of a ton of CO_2. All aspects, from the supply side to the demand side have been analysed: there are clearly many energy and economic challenges and opportunities.

Technologies and solutions to address the EU's energy efficiency targets across all market segments are available today and well known. New technologies leading to a significant shift in the approach to energy consumption, such as changing fuel mixes, developing clean fuel technologies or to carbon sequestration or storage solutions require further development and will provide most of the gains after 2020. Furthermore, implications associated to some of these new technologies, such as bio-fuels or carbon capture and storage (CCS technology) still need to be evaluated.

Primary energy consumption EU25 (1750 Mtoe) in 2005

Source: Action plan for energy efficiency, European Commission

Therefore the most economic and simplest way to reach the EU's 2020 goal is to massively target energy efficiency, focusing on the inefficient use of energy across market segments and taking up and diffusing technologies which are available today. This is technically and, in general, also economically feasible.

The diffusion of energy efficient technologies will lead to energy savings and as a consequence to the projected 2020 CO_2 emissions reduction target. At the same time, technologies and services already available on the market will increasingly play a major role in the control and optimisation of the use of all energies.

Technologies, such as renewable energy sources are, in most cases, currently not commercially viable, but are complementary to energy efficiency solutions: first in case the penetration of energy efficiency measures is not fast enough and, secondly, in order to play a major role in the future CO_2 reduction gains Europe will need to achieve in the midterm. These longer term issues are dealt with in chapter 3.

Estimates for full energy saving potential in end-use sectors

Sector	Energy consumption (Mtoe 2005)	Energy consumption (Mtoe) 2020 (Business as usual)	Energy saving potential 2020 (Mtoe)	Full energy saving potential 2020 (%)
Households (residential)	280	338	91	27%
Commercial buildings (tertiary)	157	211	63	30%
Transport	332	405	105	26%
Manufacturing industry	297	382	95	25%

Source: Action plan for energy efficiency, European Commission

2.2 Key stakes

Overall, the biggest challenge relates to the installed base: 80% of the installed base that will be there in 2020 exists already. The EU's 2020 goals will only be reached, if a very large part of the installed base is improved or renovated significantly and if any new investment is designed and built using "best technologies" from an energy efficiency perspective. Taking measures in this direction is therefore a matter of urgency: every year that passes reduces Europe's chances of reaching the goal.

Recent experiences with, for example, motors, drives, lighting systems or appliances show that the adoption of the most energy efficient products or technologies, despite their economic attractiveness, is not as easy as we may have anticipated.

The lack of awareness and understanding of the issue, or, for example, the lack of tangible incentives and regulation to foster energy efficient investments must be recognised.

A wide range of measures, adapted to the different market segments and their stakeholders, is of fundamental importance, since the capacity and willingness of people and organisations to invest in this field will have to be generated to turn the challenge the EU faces into a success.

A simple macroeconomic simulation, based, on the one hand, on the energy saving (cutting the annual energy bill) which is accessible to stakeholders (utilities, industry, home owners, consumers) and on the other hand on what can be considered as an acceptable return on investment (ROI) for them illustrates how much growth and overall economic activity energy efficiency may create. This is why energy efficiency must be taken very seriously by all actors and should be a driver in Europe.

The accessible energy savings generally range between 10% to 20%, based on addressing the active part of installations using existing technologies, which directly or indirectly allow the control of most energy usage.

The stakeholders' expected payback time of course varies depending on the type of business they are in: the time ranges from 5 to 10 years for households, public buildings or major infrastructure to under five years for industry and private tertiary actors.

On the basis of hypotheses developed in this report, this would lead to potential investments in energy efficiency, which should translate into an additional two digits average annual growth for Europe's electrical and electronics industry. The power generation, transport and distribution of electricity and buildings (commercial and industrial) segments should see 15% to 20% growth, while the industry, infrastructure and residential sectors should see a growth of between 10% to 15%. Durable consumer goods, will find it difficult to reach this level, which only further reinforces the importance that mobilisation and incentives will play in the drive to achieve greater energy efficiency.

The additional manufacturing output generated in Europe (€ 20 to 30 billion a year) will be of course amplified by the impact that this "growth engine" will have on the whole business chain and particularly on contractors and integrators.

Some simulation exercises have already been carried out, for example, on power capacitors (ZVEI) or drives (manufacturers): they both conclude that the size of these product markets should more than double. The greatest effect should be felt in the areas of capacitors, drives, transformers, lighting systems, buildings and home automation and control, performance contracting services, top energy performing appliances, power generation, transport and distribution technologies and traffic control systems.

In conclusion, incentives, but also the right legislative framework, standards, technical regulation, education, general awareness and developing competencies are the main areas to focus on to overcome the barriers to adoption of the available energy efficient technologies.

2.3 Market segment specifics

Recent studies show that the largest part of profitable CO_2-reduction potential is found in buildings and in industry, but also transport and energy have significant CO_2-reduction options at a reasonable cost.

2.3.1 Buildings (commercial & industrial) and the residential sector

The buildings segment covers a large scope of applications such as office buildings, hospitals, commercial malls, train stations, etc. Some of these contain heavy processes, such as data centres and will have to be concerned by the present buildings and industry segment proposals.

With their related services, they represent some 20% of the overall final energy demand of which more than 50% is in the form of electricity.

The contribution to CO_2 emissions reduction of buildings will arise from:

- The use of low consumption – high efficiency loads (lighting systems, motors, power capacitors, transformers, cables).
- The optimisation of the use of these loads through intelligent automation and control (energy management systems).
- The implementation of procedures and tools to monitor and maintain the systems.

Energy management systems are a fundamental part of the overall solution by allowing optimised use of energy, general reliability and sustainability of performance.

The investor is often not the user of the building (investor-user dilemma) which means that investment rather than energy efficiency considerations may be more important to him.

More than 50% of the energy used in buildings is electricity. Solutions are available to contribute to the overall energy performance of these. 30% savings are possible with today's technologies. Performance contracting experiences demonstrate the validity of such potential savings, without even having to touch the structures of the existing buildings.

Homes represent some 20% of the overall final energy demand of which up to 40% is in the form of electricity. The residential segment represents some 29% of the electricity consumption. It is growing particularly fast due to the increasing penetration of electrical equipment in the home. Electrical appliances represent 40% to 50% of the total electricity consumption in the home. Better efficiency can be achieved thanks to the use of highly energy efficient products and systems, the optimisation of the use of these products through intelligent automation and load control and appropriate monitoring and maintenance to keep efficiency optimal.

The overall cost of top class energy efficient products and systems is, however, still too high to promote their diffusion on a wide scale without incentives. Moreover, the lack of market surveillance to enforce existing EU regulation is jeopardising the investment of industry in efficient new technologies and hampers the diffusion of efficient products and systems on the market.

Major potential innovation in the field of decentralised energy sources and production are emerging; they will complement the above, but their practical impact on CO_2 reduction will occur only in the mid to long term, as such technologies will mainly be used for new construction.

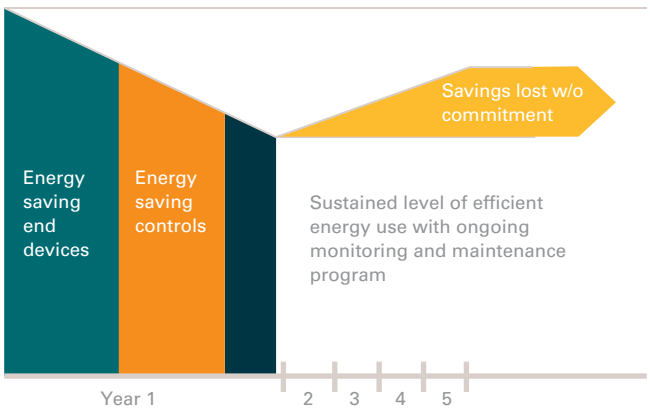
The necessary incentives and willingness of consumers to take up the most efficient products will be decisive for this segment. At the same time, major savings can arise from changing people's behaviour at home (temperature settings, presence detection, etc.).

Better information of end users is therefore a prerequisite to mobilise households and to put pressure on the contractors, installers and distributors. The training along the whole supply chain of energy usage will then be necessary to deploy and install solutions which are often made up of a range of products coming from different suppliers.

On the regulatory front, labelling schemes in household appliances have proved to be successful in driving buying decisions.

The estimated average investment in Electra technologies to be made by a consumer, before 2020, is in the range of an equivalent of one year's full energy bill. This is against energy savings of between 10% and 20% per year. Nevertheless it will require that the consumer should provide the initial investment outlay, which may present a challenge.

Energy Consumption



2.3.2 Industry

Industry represents some 30% of Europe's primary energy consumption. The overall potential final energy gain is estimated at 10%, but there are big differences between industry sectors and processes: an energy savings potential of between 30% and 65%, at least in many processes, can reasonably be expected.

Technologies to increase energy efficiency are readily available: motors are installed in all manufacturing plants and represent close to 70% of the electricity used in industry; 88% of the motor drives are not electronically controlled today. Out of these, some 50% can be equipped with variable speed drives to achieve energy savings, during partial load, of up to 50%.

In addition, waste heat recovery has an important part to play to foster energy efficiency. Approximately one third of the energy used in industry is heat. Industrial waste heat is generated in many processes and often discharged into the atmosphere. Whenever surplus process heat can no longer be used in downstream process steps, producers should consider transforming it into electrical power. Lighting systems, optimisation of the load of transformers thanks to an optimised power factor and improved quality and service thanks to uninterrupted power supply (UPS) or electronic power supplies are some of the additional technologies to achieve energy efficiency targets.

The challenge is to ensure that any new investment is designed based on voluntary lead standards and that the installed base is renewed or retrofitted everywhere that this is economically feasible. Investment decisions in energy efficiency measures need to become a strategic management decision: this is usually not the case. As a result investment in productivity or production usually comes first.

Better information of all end users is a prerequisite, with the training of the whole business chain. The economic constraint is important as return on investment is fundamental for industrial actors, who try to ensure that payback times are as short as possible.

The general approach for improving energy efficiency in industry is based upon performing an equipment inventory, an assessment of the energy savings potential for each piece or group of equipment, and an action plan with monitoring and reporting. This can be developed through a professional audit of the main processes.

The business environment and regulation will therefore need to make the topic of energy efficiency as important as quality models such as the ISO9000 and 14000 standards or the Capability Maturity Model (CMM) scheme in the field of software development. An ISO energy efficiency model, focusing on energy efficiency management needs to be developed and deployed as soon as possible. It will facilitate benchmarking by type of industry and application; such elements would help CEOs to make decisions and develop their plans.

2.3.3 Transport

The transport sector represents approximately 19% of the overall energy consumption in the EU. Even though the share of electricity is rather small, technologies provided by the Electra industry have a decisive role to play on the use of fossil fuels. The transport and logistics sector are vital for the competitiveness of all industries, for example because of the costs implied for consumers and for the complete goods supply chain. The key challenges here are:

- To ensure the competitiveness of industry and sustainable transport.
- To overcome political barriers, in particular in cross-border transport or infrastructures.
- To foster the diffusion of technologies.

Road infrastructures, in particular, are usually a public good; therefore all users benefit from investments made, but, on the other hand, public budgetary constraints and "return on investment" hamper the deployment of technologies.

In rail transport, in particular for freight transport, no efficient cross-border system has been established to date.

In air transport, the large number of local air traffic management organisations hampers the creation of a single European sky, thereby leading to wasted time and energy.

If much of the effort needs to be made on creating a true internal market in the area of transport, there are areas where existing technologies can bring better efficiency:

- Road transport: piezo direct injection for cars, LED traffic lights, road telematics, efficient street and road lighting systems and traffic congestion avoidance by traffic control systems.
- Rail transport: rail energy storage or automatic train supervision.
- Maritime transport: eco-friendly port-berthed power, waste heat recovery systems and thermo-efficient systems in vessels.

2.3.4 Power generation, transmission & distribution

Today much of the installed conversion systems from primary energy to useful forms of energy are highly inefficient. This is due to the very important impact of the already existing major share of power generation installations, with efficiency often as low as 33%, while it could be higher than 50% with existing technologies. Moreover in the EU, approximately 7% of the generated electricity is lost in the power transmission and distribution. Improvements therefore need to be made throughout the whole electricity production, transmission and distribution chain.

Key technologies in this area include conventional power plants, renewable generation, dynamic energy storage, transmission and distribution grids, high voltage direct current (HVDC) power lines, grid flexibility and reliability, substations, carbon capture and storage (CCS) or combined heat and power (CHP).

A drastic change in the portfolio of power generation in Europe is unlikely to be feasible at present, for both economic and political reasons: therefore the challenge is to create the legal and economic environment which will motivate and support the electrical utilities industry to apply the best available technologies on the installed base, while at the same time favouring the introduction of renewable sources. At the same time, this sector faces a number of other challenges:

- The reliability of the electricity supply and the stability of voltage and frequency are becoming more and more critical.
- The optimisation of the power transmission and distribution grid, with regard both to energy efficiency and to accepting decentralised micro power generation plants or systems. "Super Grid" projects mixing long distance high voltage direct current (HVDC) and /or smart grid technologies are urgently needed. There is a need for a fundamental restructuring of the grids.
- The availability of scientists and engineers with an educational background in energy technology sciences.

If the measures proposed in this report and its annexes are effectively adopted, we estimate that the potential energy efficiency gain for the whole sector will reach 14%; these savings will vary between countries, but the order of magnitude should be the same.

The efficiency gains that can be derived therefore merit a more in depth collaboration between the institutions, European and national, the electricity utilities industry (Eurelectric) and the technology providers in Electra.

2.4 Proposed recommendations

The EU's objectives can be facilitated, if a stable, predictable and appropriate regulatory framework as possible is established that mobilises market forces and increases competition, thereby driving innovation and investment. The deepening and completion of the internal market in order to create a larger accessible market and increased competition are indeed a prerequisite.

Engaging business actors is critical for both environmental and economic success. We stress the importance of ensuring that integrated policies create opportunities to mitigate the cost of tackling climate change for all: it is essential that solutions enabling the shift towards a global low carbon and prosperous economy do not damage economic development, including in energy-intensive sectors. The benefits and challenges of a sectoral approach suggest that, building policies around carbon or performance benchmarks and/or indicators may provide an equitable way to engage other regions.

The development of the proposed measures will require, in most cases, the contribution of all concerned stakeholders (EU institutions, Member States, industry) but lead initiators are suggested as specified hereafter:

EU institutions

- Refocus its policy more on developing growth and jobs through its programme for CO_2 reduction, including developing incentive schemes and policies other than the ETS to mobilise the economically attractive potential in the buildings, industry and other sectors. To achieve the 2020 targets this should get more emphasis than in the past.
- Foster R&D programmes, technology roadmaps and an innovation policy to support early demonstration and maintain or create lead customer markets:
  - According to the lighthouse projects and learning curve effect model (for instance Green buildings, smart grids, a high voltage direct current-grid (HVDC)).
  - Allowing the development of energy efficiency metrics and metrics for the economics of CO_2 reduction.
  - Supporting the development of dynamic energy storage on a large scale to promote the deployment of renewable sources (small scale generation plants and decentralised installations for residential, commercial and industrial buildings).
  - Helping to remove barriers from regional planning and simplifying planning permission processes (transportation, grids, renewables).
- Set overall energy efficiency targets for each Member State and enforce national binding roadmaps or action plans (NEAPPs) independently of the given Member State's energy mix, based on an exhaustive inventory of the current local environment and stimulating smart metering and intelligent power management.
- Foster the adaptation of the architecture of the transmission and distribution grids to improve their overall efficiency:
  - With interconnections and management according to a European energy supply scenario.
  - Coordinating the Union for the Coordination of Transmission of Electricity (UCTE) with a cross border and real time dynamic view.
  - Increasing the transmission and distribution voltage where possible and enhancing transformers' installed base to reduce overall network losses.
  - Setting new rules to increase power factor correction so as to optimise overall network efficiency.
  - Developing an incentive regulation rewarding investments – as an example – improving the efficiency quality of the grid.
- Develop benchmarking and good practices' sharing with harmonised performance criteria or metrics:
  - Creating and launching a management scheme associated to energy efficiency and CO_2 reduction expanding on the Energy Performance Buildings Directive (EPBD) in the spirit of the ISO14001 standard and the Capability Maturity Model (CMM) scheme used in the field of software development.
  - Making mandatory and funding of audits and diagnostics of the installed base.
  - Providing energy passports or labels.

Member States

- Launch a massive information and education campaign aiming at raising the general awareness of all actors:
  - Fostering investment in new power engineering competences to face the resulting growth.
  - Educating the business community and particularly the installers, schools and, more generally, the general public (obligatory energy efficiency courses as part of the curriculum or apprenticeship).
  - Enforcing the use of the life cycle cost approach for installations and equipment.
- Ensure leadership of public authorities, showing the example with ambitious and visible investment plans:
  - Stimulating public-private partnerships (PPPs) in the areas of, for example, energy performance contracting and energy services.
  - Delivering leading edge (lighthouse) demonstration projects.
  - Creating national bodies to develop sharing of best practices.
- Launch long term fiscal policies and financial incentives plans adapted to each sector:
  - Encouraging investment and renovation in energy efficient products and systems and discouraging old inefficient technologies.
  - Encouraging the closure and replacement of the least efficient installations.
  - Fostering proper maintenance and renovation of the installed base.
  - Providing adequate attractive feed-in-tariffs for decentralised power generation installations.
  - Fostering financing tools, such as green funds, soft loans for investors or tax credits, purchase rebates, cash-back schemes granted directly to the consumer.
  - Overcoming the investor-user-dilemma by studying the use of "internalising" charges to investors for energy efficiency gains not utilised.

Industry and the EU institutions

- Extend technical regulation for homes and buildings to include the active energy part:
  - Transforming current regulations and codes into global ones encompassing all applications.
  - Setting minimum energy efficiency criteria for loads and installations.
  - Making these applicable to new and to existing installations.
  - Fostering transparency of energy consumption through audits, labelling or passes.
- Set appropriate minimum energy efficiency or environmentally friendly legal requirements for products and systems:
  - With, where appropriate, dynamic labelling schemes facilitating the commercialisation of the most efficient products and evolving over time according to business impact assessments.
  - Fostering, where appropriate, voluntary global European lead standards.
  - Fostering an European Top Runner approach (see Orgalime proposals on www.orgalime.org).
  - Complement the Eco Design requirements of Energy using Products (EuP) Directive with new EU-wide measures tackling the efficiency of installations or systems, so as to also foster systems related approaches (SrA).

FUTURE TECHNOLOGY MADE IN EUROPE

AND SHOWCASED TO THE REST OF THE WORLD

Chapter 3: Generating more growth from innovation and investment in key European electrical engineering markets

3.1 Introduction

One of the largest growth drivers for Europe are European infrastructures. The electrical engineering and electronics industries provide innovative technologies for future high tech infrastructures and can help to develop lead customer markets based on the idea of "future technology made in Europe, applied first in Europe, and showcased to the rest of the world", which has the potential of providing growth.

In this chapter, we focus on the future vectors for growth – what we term as lead customer markets – on the drivers to ensure their deployment first in the EU and on the barriers that hamper growth and the adoption of new technologies. Finally we recommend public policy options for facilitating the development of these lead customers. We believe that sufficient new innovative technologies will be available but their deployment and diffusion in the EU is likely to be too slow, in a business as usual mode.

A typical best practice for the successful application of high technology is the GSM story. Galileo could become another success story. However, in order to be competitive in the global environment and in heavy competition with other market places, Europe needs more success stories. Key technologies that demonstrate the strength of Europe, its innovation force, its brain pool, its knowledge of trends and developments, often need a "market pull" orchestrated by the relevant players including political decision makers, with the objective to create "lead customer markets" for future technologies in Europe. The European Commission's Lead Market Initiative is a very good first step to secure the early application of best technologies made in Europe.

3.2 Lead customer markets for innovation

Today the largest customer markets for the electrical engineering and electronics industry are automation (including electrical drives, measuring techniques and process automation, switchgear and their components, control gear, digital infrastructure markets (including CE, HDTV devices, TVs media equipment)) and the energy infrastructure and industry markets.

The highest growth rates today are in the area of health (+7% p.a.), digital technologies (+6% p.a.) and security (+4% p.a.). Based on existing studies and forecasts of ZVEI – the German Electrical and Electronic Manufacturers' Association, the growth potential for these lead customer markets is estimated to an amount of potentially more than €100 billion per year by 2020 (partly including investments mentioned in chapter 2).

Estimates of growth potentials

Lead markets	Market value in 2005	Annual growth potential
Energy[1]	22 bn €	3%
Automation (of which)	58 bn €	2.5%
• Electrical drives	14 bn €	3%
• Switch components, switchgear and controlgear, industrial steerages	19 bn €	3%
• Measurement technique and process automation	25 bn €	2%
Transportation	n.a.	n.a.
Health	13 bn €	7%*
Security	14 bn €[2]	4%
Digital radio +TV/HDTV	25 bn €[2]	6%[3]
Total	**132 bn €**	

* Average annual growth rate of EU 27 market between 1997 and 2005.
1. Infrastructure and industry
2. Estimate (FV)
3. Average annual growth rate of EU 27 total consumer electronics market between 1997 and 2005

Source: ZVEI – German Electrical and Electronic Manufacturers' Association

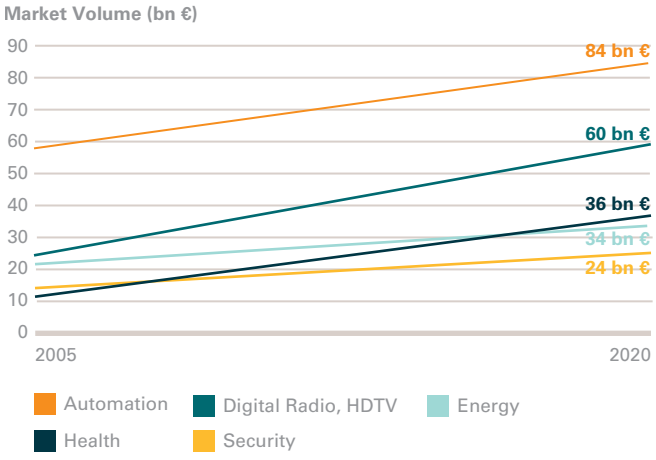
Nevertheless, in the light of globalisation and our intensifying competition with emerging economies, Europe has to make more efforts to stay ahead of competitors to secure its economic and social prosperity. Since Europe is not able to compete globally on costs, an innovation agenda is needed. Innovation is the successful marketing of new technologies or processes, not just their invention.

From the industry point of view, lead customer markets in the EU are market situations that demand the most innovative and best technologies, systems, products or services in order to satisfy customers' needs. Lead customer markets are where the customers and the fast application of new technologies are. This applies in particular to new technology based products or to complex combinations of products and services, increasingly required to develop innovative goods that can meet consumers' interest worldwide. Lead customer markets can help to meet public and political goals such as energy efficiency, sustainable use of resources, healthy living, security, mobility, information and communication needs of the EU population. Lead customer markets for the electrical engineering and electronics industry potentially include:

- Trans-European networks, transportation infrastructure, telematics.
- E-health infrastructures and nano-diagnostics.
- Energy generation, transmission and distribution infrastructures, including critical power and carbon capture and storage (CCS).
- Civil protection, homeland security and defence.
- Buildings, intelligent living, ambient assisted living.
- Automation, industrial IT.
- Digital radio and TV, high definition television (HDTV).

Key drivers include regulation, economic and fiscal incentives, and attractive investment conditions in lively capital markets, a strengthened and deeper EU single market, harmonisation, standardisation, individual demand and, just as important, public acceptance.

Lead Markets growth potential from 2005 until 2020



Source: ZVEI – German Electrical and Electronic Manufacturers' Association

3.3 Trends, challenges and potential technology solutions in the identified lead customer markets

3.3.1 Mobility, moving and transporting people and goods across Europe: Trans-European networks, transportation infrastructures, telematics

European towns and cities are today confronted with a constant increase in freight and passenger flows. Growing urbanisation and increasingly complex mobility requirements lead to a strong demand for new intelligent and flexible transport solutions and services. Urban mobility is an important facilitator of economic growth and employment with a strong impact on sustainable development in the EU. The challenge is to manage the increasing transport demand in a way that guarantees better mobility, mobile access to information, quality of life, safety and environmental protection.

At a national level, policies are often fragmented and incentives for infrastructure investments are generally limited. Nevertheless, the demand for an ever closer integration of the EU and the pressure from globalisation will favour the development of trans-European rail and road networks, airport and port infrastructures as well as specific technologies linked to these developments and aimed at enhancing security and the environmental impact of transport, such as the development of "intelligent roads" which greatly enhance traffic management and safety.

As a result of these demands and trends, we are seeing a number of technology solutions and applications being developed today or in the near future, such as car-to-car and car-to-infrastructure communications, eCall, the Galileo satellite navigation system and the European train control system (ETCS).

3.3.2 Living long and healthy: E-health infrastructures and nano-diagnostics

In Europe, we are living in an ageing society which will inevitably have an impact at many levels, including access to medical treatment and value for money, in spite of new and often costlier treatment methods. Major challenges in this field today are rising costs and budget constraints, the insufficient uptake of innovation, which is affecting the quality of medical care, market fragmentation, lack of interoperability and little private investment.

We believe that this trend will lead to a paradigm shift from hospital to home care with, at the same time, more private investors investing in health infrastructures. As a result there will have to be strong developments of eHealth which combines ICT with new medical technologies. Among the merging technology solutions are, for example the electronic patient record (EPR), electronic health care record (EHR), smart cards, radio frequency identification (RFID) and, increasingly, mobile computing.

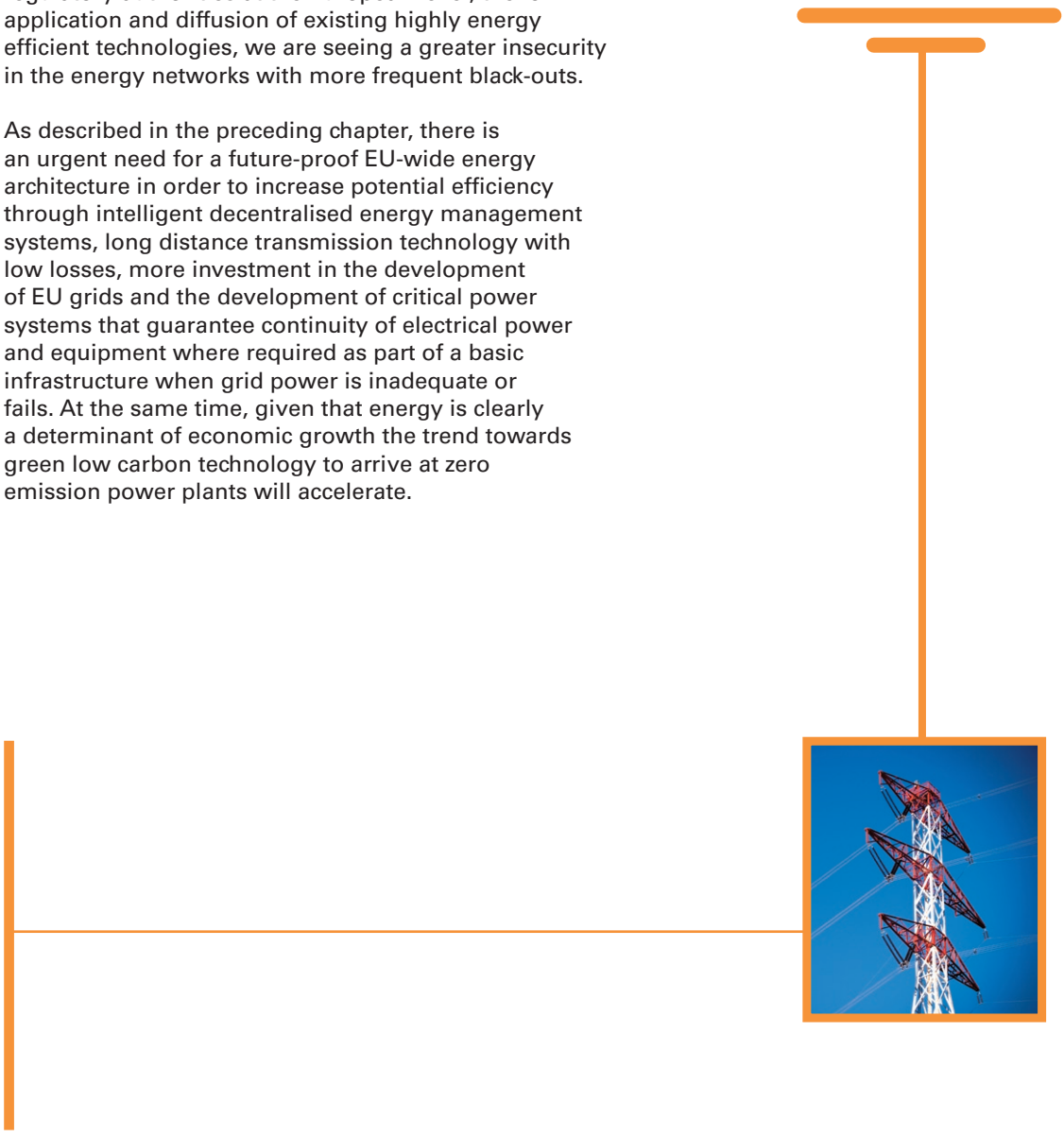
Nanotechnologies will also become a major development area: if at the present time we are obtaining greater insight into how genetic differences between individuals can affect treatment, the development of nanotechnologies will increasingly facilitate faster, more accurate and less expensive diagnostics and treatment. Future developments will include the convergence of nanotechnology and medical imaging towards molecular imaging thereby facilitating the early screening and diagnosis of diseases before they have a significant and serious effect on the body. Other developments include advances in in-vitro diagnostics, improved detection techniques, nano-probes, nano-particles for drug release and imaging, clinical cameras for whole-body images and biometric sensors encapsulating contrast agents.

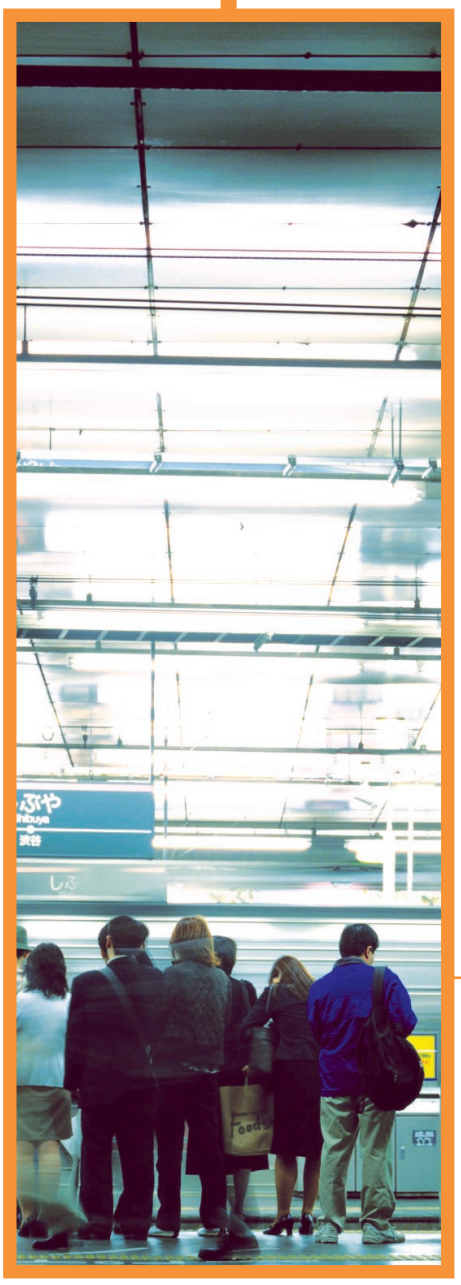
3.3.3 Light, heat and power for our daily life: energy generation, transmission and distribution infrastructures

The key challenges that Europe faces today include the soaring costs of energy and the rising demand, driven by growth of population and of economies. The developing and, in particular, the developed world depend crucially on the continuous supply of energy. The need to renew Europe's electricity networks, enable a trans-European electricity market and integrate more sustainable generation resources (including renewables) are fundamental requirements for creating a secure and efficient energy generation, transmission and distribution infrastructure in Europe. With the internal energy market far from complete and the lack of coordination in operational work of national regulatory authorities at the European level, the low application and diffusion of existing highly energy efficient technologies, we are seeing a greater insecurity in the energy networks with more frequent black-outs.

As described in the preceding chapter, there is an urgent need for a future-proof EU-wide energy architecture in order to increase potential efficiency through intelligent decentralised energy management systems, long distance transmission technology with low losses, more investment in the development of EU grids and the development of critical power systems that guarantee continuity of electrical power and equipment where required as part of a basic infrastructure when grid power is inadequate or fails. At the same time, given that energy is clearly a determinant of economic growth the trend towards green low carbon technology to arrive at zero emission power plants will accelerate.

The technology solutions, also largely highlighted in the previous chapter include smart grids, high voltage direct current (HVDC), renewables, low-carbon technologies and storage systems. The development of carbon capture and storage (CCS) should also play an increasing role, given the dependence of many countries on fossil fuels. The high costs of CO_2 capture and storage will lead to a drive to develop cleaner and more efficient fossil fuel combustion plants, pre-combustion decarbonisation technologies and oxy-fuels combustion.





3.3.4 Living and moving safely across Europe: civil protection, homeland security and defence

There will be a rising demand for security solutions in Europe arising from new security threats to the EU from terrorist attacks, illegal migration and others. Security areas include the protection of critical infrastructures (networks, sensitive sites), the development of building security, IT, tracking and tracing, scanning and detection technologies, the latter being largely driven by the public sector. Four areas will therefore most likely see stronger development: security of citizens; security of infrastructure and utilities; security at the borders of the EU; and restoring security in the framework of crisis management.

3.3.5 Buildings for an intelligent living and ambient assisted living

While security is a clear driver in the residential and commercial buildings market, other factors will also play an increasing role: the increase in single person households and the increase in working from home.

There will therefore arise a demand for increasingly broad, but at the same time personalised home infrastructures including door locks, alarm, remote access to heating, lighting, work sites, etc. Given the rising cost of energy there will also be a greater demand for integrating energy efficient solutions over which the citizen has more control than today. As a result there will be the development of technology solutions providing interoperable remote access and control, detection and notification and "greener" buildings including both passive and active energy efficient technologies. This altogether will lead to an intelligent living environment.

3.3.6 Higher productivity and efficiency in industrial processes: automation, industrial IT, RFID

With the growing need for information processing and the increasing complexity in production processes, rising pressure on productivity gains and a requirement for cost savings, the demands on this sector will continue to rise. If today the automation industry is mainly driven by the automotive, machinery and chemical industries in Europe, in future it is likely that there will be an increasing demand to serve decentralised production facilities throughout the world. As a result, internet-based and radio frequency identification (RFID) technologies will continue to develop strongly.

3.3.7 Access to new, tailor-made information and content at better quality

The further development of the European information society is creating a stronger demand for new content, broader diversity, more interactive media, better quality and flexible viewing. Progress is at present being slowed down by uneven transition from analogue to digital infrastructures across the EU, to different standards, and the lack of successful business models and content, the latter due to reluctance of content providers.

EU-wide digital infrastructures (radio and TV) will allow for a wide variety of content and services and competition will no doubt grow and there will be an increasing need for standardised technology solutions such as high definition television (HDTV), conditional access and common interface technologies.

3.4 Lead customer market recommendations

Crucial for the development of lead customer markets are reliable long-term framework conditions that foster necessary investment in European infrastructures, especially at the levels of regulatory certainty and consistency for incentives and return on investment.

In order to mobilise EU technology markets there needs to be a drive to introduce new technologies through smart regulation of lead customer markets: mobilise competition, create demand by combining privatisation with investment obligations and allow many competing technologies to enter the market. We list hereunder our main recommendations for the development of lead customer markets.

3.4.1 Foster high-tech infrastructure modernisation

The early adoption of new technologies in this area can be facilitated in Europe by implementing a policy framework which promotes competition, investment and innovation in infrastructure markets through:

- Using TEN projects, regional funds, cluster policies and other levers to promote the application of new technologies, thus making the EU lead market for these technologies.
- Providing EU coordination and accelerate investment for TEN projects and standardise technologies to be introduced, for example for railway infrastructures, communication networks, traffic control systems, etc.
- Fostering the application of ICT in all fields of government, industry, education, health.

3.4.2 Mobilise EU technology markets

- Drive faster introduction of energy efficiency and alternative energy technologies in the context of the EU climate change initiative.
- Introduce an EU benchmarking approach for power station technologies as well as for household equipment.

Cutting off the least performing technologies should be incentivised.

Unbundling is one way to accelerate investment in the energy sector, but another easier and quicker solution might lie in targeting directly the creation of cross border grids and a high voltage flexible grids. Crucial in this area will be the connecting of investment obligations to the new ownership of the (overlay) network.

In the area of transport of electricity, the auction of cross border European lines to new owners and operators should be considered, as this will accelerate investment.

3.4.3 Attract more private funding and EU regional funds to build EU high-tech infrastructures

- Initiate PPP examples in cross-border infrastructures in the TEN contexts for railway, power grid, air traffic control, road traffic control, etc.
- Start an EU fund for energy efficiency and all other CO_2 reduction investments to be repaid from the energy savings of investors and operators.

The volume of funding in structural funds foreseen from 2007 until 2013 is €350 billion. The declared investment goals include: R&D, innovations, infrastructure, renewable energy, energy efficiency, competitive position, mobility, renovation of rural areas. Our recommendations include:

- Provide means from regional funds for the promotion of lead markets.
- Amend the European Development Fund Regulation to include countries that are not included today for energy efficiency in housing and buildings measures.
- Starting, at a national level, lead market funds on the paradigm of regional funds.

3.4.4 Initiate EU lighthouse projects for lead customer markets

- Focus on Galileo, Digital EU Patient Card, Digital EU Identity Card, a high voltage direct current (HVDC)-grid, radio frequency identification (RFID), cross-Europe high speed transport lines.
- Set up technology roadmaps for EU driven eHealth, e-Government, security and mobility solutions, for example for the future "megacities".

3.4.5 Mobilise EU-lead market investments by smart regulation

Make investment in the EU more attractive by fostering venture capital and private equity in lively financial markets:

- Develop smart competition policy to stimulate investment.
- Improve conditions for small business financing by fostering entrepreneurship in the EU.
- Attract investment by promoting more public-private partnerships (PPP) and private financing of infrastructure modernisation.
- Enhance cross-border investment and ease access of foreign direct investment in the EU.
- Channel more EU Regional Funds into tech based infrastructure to stimulate introduction of new technologies in the new EU countries.
- Start European "green funds" managed by local banks, in which pension fund money could be collected and invested in energy saving projects. The use of these "green funds" should be tax deductible at the level of the individual investor.

3.5 Start specific EU lead market initiatives

We propose lead market initiatives in the following sectors:

3.5.1 Mobility / transportation:

The EU needs more European-wide solutions and best-practice sharing (road, rail, air transport) orchestrated by the European Commission in order to avoid fragmented approaches: the ideal lever will be the utilisation of cohesion funds for lighthouse projects. Infrastructure markets also need to be opened to PPP investments.

There should also be a drive to promote urban road charging schemes and road telematics by internalising of traffic congestion costs: these measures will require a large degree of intervention from national, regional and even local authorities.

3.5.2 Health

E-Health will become one of the stronger drivers for growth, jobs and innovation in the EU. Growth in the health sector has the double attraction of being locally distributed in the EU and offering a high local value added. E-Health and nano-diagnostic solutions can help to deliver better care at lower cost.

The Commission should coordinate and take measures to overcome the fragmentation in the e-Health governance, to develop innovative economic models and medical use cases, to provide the necessary economy of scale by fostering interoperability for the healthcare-IT industry based on international standards and building trust and legal certainty. This task will require a mix of EU regulation, backed up at national level as well as the active involvement of industry stakeholders in the area of providing standardised solutions, in particular for communication among systems.

3.5.3 Energy

Driving competition and setting a stable and predictable regulatory framework in the energy infrastructure markets is fundamental. This task will largely accrue to the European Commission.

The efficient use of energy resources alone will not solve the problem of long-term energy shortage. The solution is a better energy mix including keeping and developing know-how in the nuclear industry and promoting renewable energy sources, carbon capture facilities, more flexible and reliable grids, long distance transmission, a decrease of energy losses during its transport/distribution and incentives to invest in European energy infrastructures. This task will require a mix of EU regulation, backed up at national level to reduce investment lead times.

3.5.4 Security

Security technology can contribute to a more secure Europe for both citizens and institutions. At the level of the legal framework most of the areas concerning security belong to the field of national policy and administration.

At the business level, establishing a common vision in this area, as well as common public procurement approaches would be helpful. Up to now an overextended interpretation and use of Article 296 of the EC Treaty is proving to be a hindrance. Besides, the establishing of a one-stop testing – one stop certification procedure concerning quality labels would open the market in the field of public and private security. The support of the EU institutions in this sensitive area to accomplish this would be highly appreciated.

3.5.5 Intelligent living / ambient assisted living

Advanced building technologies provide a high level of convenience and safety and help cut costs by making it possible to network intelligent products and systems in the areas of home automation, heating, climate control, ventilation, fire protection and security for example. There is a need to promote solutions and services based on technology to users in order to stimulate their demand for such products on the market. Further standardisation of all infrastructure related systems is needed, including, in particular, basic standardisation of human-machine interfaces; standardisation of system aspects to enable services to buildings. If the lead in this area should be taken by industry, the support of the EU institutions would be welcome.

3.5.6 Automation / industrial IT

IT standards and radio frequency identification (RFID) play an important role to foster the productivity of the manufacturing industry. Defining open international IT standards, in particular transmission standards, is of key importance. For RFID, the spectrum and frequency allocation, as well as ensuring data privacy, play a vital role: at this level the EU institutions play a significant role, while, in the standards area, it is up to industry to take the lead.

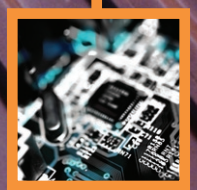
3.5.7 Digital radio and TV, high definition television

Higher quality and broader diversity of programmes are already requested by many consumers. Access to individualised content and availability of several frequencies are newly arising needs.

In Europe, it will be important to ensure an EU-wide switch-over from analogue to digital in 2012. This will all the more stimulate the defining of business models for new or additional digital content and services. This task will largely accrue to the industry.

However this will happen in so far as the EU institutions set up a regulatory framework for new digital media – digital right management systems (DRM), copy protection – and generate frequencies for mobile broadcasting and HDTV in Europe. The conclusions of the High Level Group on ICT should be taken into consideration.

Today, foreign trade is the main contributor to output growth



Chapter 4: Opening the internal and export markets of the European electrical engineering industry: challenges in the area of regulation, trade barriers and standards

4.1 Introduction

Both in the internal European market and on its export markets, the electrical and electronics engineering industry is today not reaching its full market potential. The current state of the internal market does not allow for the full exploitation of the advantage that the economies of scale provided by the size of the market should provide. This is due largely to the framework conditions faced by this and other industries. Given the importance of intra trade, accounting for a 60% share of the trade in the industry's products, any measures which will enhance the potential for trade inside the EU will present the industry with new growth potential.

Today foreign trade is the main contributor to output growth. Important changes have taken place during the last decade: countries that only fifteen years ago subscribed to a free market economy are now attracting vast investments. In Eastern Europe, China, Russia and, in addition India, we find areas with high value added potential.

4.2 Framework conditions in the internal market

European electrical engineering companies are today under extreme competitive pressure. In order to successfully defend their technological leadership, companies need framework conditions that stimulate innovation and entrepreneurship. Too often the invention is European, but the practical result is developed and launched outside the EU. The transposition from the result into an innovative product therefore needs to be facilitated.

In a policy framework, public authorities can create the preconditions to promote competition, investment and innovation in markets where little competitive pressure and innovation exist today. With the enlargement of the EU, a clear potential has been created: the demand in the new member countries for improved infrastructures. By focusing EU funding on the higher technology infrastructures, innovation in the industry can be driven which in turn can create new growth.

4.2.1 Small and medium size enterprises

While major companies are able to invest heavily in the innovation process to the same extent as their competitors in other developed markets, for European small and medium sized companies, however, this is not the case. A number of actions are therefore needed:

- Reduce red tape for innovative companies, so that more resources in SMEs can be allocated to developing new products.
- Increase the share of SMEs in public procurement contracts by simplification of the administrative process.

4.2.2 Improve EU educational and engineering base

Skills shortage is a major point of concern for the electrical engineering industry which relies on highly skilled staff to develop its products. Engineers represent a higher percentage of employment than in other manufacturing sectors and the industry is finding it increasingly difficult to meet its needs for these and other skilled staff. A pro-active policy to ensure the supply of skilled labour is therefore key to the industry's long-term success. The following recommendations should contribute to that:

- Accelerate the transfer of know-how from research institutes and universities to businesses: this is today insufficient.
- Aim at achieving that all EU countries should send at least 50% of students through tertiary education.
- Aim at attracting at least 25% of tertiary education students into technical, engineering and science education.
- Provide for the possibility for equivalence of all technical degrees across the EU; implement science and engineering bachelor and master system across all EU countries, foster scientist and student exchanges across EU countries.
- Attract engineering talent from abroad into the EU, including by starting a call-back programme for EU engineers and scientists now working in the U.S.A. or elsewhere outside the EU.
- Encourage engineering apprenticeships
- Initiate regular EU excellence competitions of EU science and engineering schools based on education results (not research).
- Create transition points between technical education and bachelors (university) education.

There are a number of centres of excellence in different industries across Europe. However, in order to maximise the chances of achieving real economic benefits, more collaboration and a critical mass in innovative clusters is necessary. Regional specialisation is important for industries to grasp the full benefits of the internal market through economies of scale.

4.2.3 Stimulate investments in the EU electrical and electronics application markets

With large investments needed in the EU, in particular in many of the new Member States, notwithstanding the assistance provided by structural funds, more growth and business opportunities could, besides the recommendations included in Chapter 3.5 be generated by:

- Taking energy efficiency automatically into account in public procurement: the use of voluntary and incentivised lead standards should be introduced.
- Initiating EU-wide investment initiative requiring national budgets to steer a healthy balance of consumption and investment expenditures.
- Promoting better investment conditions in all EU countries for venture capital and private equity.
- Promoting investment increase by combining investment requirements with privatisation of infrastructure.

4.2.4 Mobilise the infrastructure market

Further liberalisation of infrastructure markets (energy, transport, fixed telecom networks) is urgently needed to stimulate investment in modernisation and new constructions. This could be achieved through the following recommendations:

- With regard to transport, there should be a policy developed for creating trans-European freight networks on rail (where possible using disused railway networks) and high speed passenger lines.
- Undue supplier and product requirements by government owned infrastructure operators, such as local content requirements, should be eliminated.
- Technical standardisation of infrastructure products and systems to overcome incompatibility of EU systems, in particular in railways, power grids, medical equipment, need to be accelerated.

The first two recommendations should be driven by the EU institutions (with Member States for the first recommendation) while the last recommendation requires a collaboration between the European Commission and industry.

4.2.5 Support entrepreneurship

To strengthen entrepreneurship and improve operating conditions for entrepreneurs and established businesses it is recommended to:

- Support and accelerate the introduction of innovation by easing restructuring transition conditions for established suppliers and appliers of new and old technology (includes dealing with labour-law rigidities and restructuring costs), while at the same time facilitating reskilling of personnel through the provision of lifelong learning for employees.
- Provide fiscal incentives for risk taking in developing and applying new technologies.
- Ease the operating of companies (suppliers and operators of new technologies) to expand across EU borders by acquisitions, forming subsidiaries and relocating staff across borders.
- Simplify the founding of EU companies by a small EU company scheme (the European Private Company Statute).
- Diminish the costs of failure for entrepreneurs on a harmonised basis across the EU. Compared to the U.S.A. there is little incentive to start anew in the EU.

4.2.6 Strengthen the capital markets

Europe is, with the exception of the UK and Switzerland particularly underdeveloped at the level of its capital markets. This inevitably limits the access of innovative companies to venture capital and private equity as well as private investments into infrastructure and buildings. If one compares the situation in the U.S.A. to that in Europe: there are 46,000 pension funds in the U.S.A. with assets of nearly €5 trillion under management. In the euro zone this capitalisation represents 97% of the GDP on average, while in the U.S.A. this ratio is 148%. The UK is an exception however: it has a high ratio – 160% – which is no doubt due to the pension funding system which is based on capitalisation rather than 'pay-as-you-go'.

In the U.S.A. too pension and social security schemes are based on capitalisation, while in Europe the majority are organised as 'pay-as-you-go' systems. Furthermore the U.S.A. financial system is based on capital markets. By contrast, in Europe the financial system is bank-oriented. This leads us to make the following recommendations which will require the intervention of both the EU institutions and Member States:

- Shift from pay as you go to more capital cover pension funding systems.
- Strengthen capital markets, especially stock exchanges.
- Allow a significant part of pension funds to go into infrastructure funds, starting with asset backed company pensions, then to private pension plans and finally public pension plans.

4.2.7 Faster technology transfer from R&D and applying innovative technologies in Europe first

Results of innovations, in particular in energy saving technologies, have to find their way to EU markets more rapidly. As a consequence:

- To bring a faster transfer of research results to the market, the industry requires a closer collaboration between research activities and standardisation (Industry action).
- Especially for young companies, treatment of intellectual property is of the utmost importance, as it represents almost the entirety of their assets. Ideally, establishing a Community patent with the right conditions will be of benefit for the entire innovation process (European institutions action).
- Strengthen the transfer of R&D results into applications in EU countries (Industry action).
- Foster technology transfer by development of regional clusters (European institutions action).
- Initiate an EU cluster benchmarking to find clusters with most growth, most success in job development and enterprise formation-transfer best practice to less developed clusters across EU (European institutions action).
- Stimulate the formation of an EU Institute of Technology (EIT) from the 100 research institute most successful in technology transfer embedded in the EU benchmark clusters (European institutions action).

4.3 Challenges at the regulatory level in the internal market

First and foremost, the industry believes that all product-related regulation should be handled under Article 95 of the EC Treaty. On a level of EU-regulation there are various hindrances to true competitiveness in the internal market. Often EU Member States allow for "gold plating": they introduce additional, super-equivalent national rules that undo harmonisation on EU level. The number of infringement procedures for wrong transposition and application of internal market rules is increasing every year. Furthermore, market surveillance needs improving and bureaucracy has to be reduced in order to stimulate more start-ups (in the U.S.A. there are ten times more than in the EU).

4.3.1 Better regulation and market surveillance

The electrical industry appreciates the change that the European Commission has achieved in the review of the legal framework of New Approach Directives, which industries believe will function as a boost for the internal market of goods. But the way in which market surveillance is currently organised in Europe is no longer adequate for an internal market without internal borders and an increasing number of third country imports.

Products circulate freely inside the Community without passing any internal checkpoints, but the powers of national authorities are limited to their own territory. The consequence is that unsafe products slip through the net and are placed on the market. These products often constitute a health and financial risk for the consumer. This situation also creates unfair competition. Therefore the industry stresses that:

- Member States should agree on a set of essential requirements for efficient Europe-wide market surveillance and commit themselves to apply it with adequate staffing and financial resources in order to match today's trade conditions.
- The Commission should take the lead in setting up market surveillance programmes with common objectives across Member States, on the model of what happens in the food sector (annual or semi-annual plan on targeted areas for market surveillance).
- The traceability of the product to the person who has placed it on the EU market should be ensured. The responsibility of actors placing the product on the EU-market should be separated of the responsibility of those designing and manufacturing the product (EU and Member States' actions).
- There should be an effective coordination of surveillance at a national level across ministries and regulations affecting the same products.

4.3.2 Research and Innovation financing

While the industry welcomes the funding provided by the Commission in the context of its Framework Programme for Research and Technological Development (FP7) and under the Competitiveness and Innovation Programme (CIP), many companies, particularly SMEs, find it both simpler and more efficient to benefit from assistance at the level of Member States, such as direct tax incentives provided at a national level. In a benchmark survey the European situation was found particularly unfavourable regarding incentives in the area of innovation. We therefore recommend that:

- National public authorities should provide specific innovation collateral for financing high risk cross border activities.
- For small and medium innovative firms that cannot use their own capital as risk capital for developing innovative products, new tax incentives have to be developed.

4.3.3 Eco-design and environmental regulations

The EuP Directive (2005/32/EC on Eco Design of Energy Using Products) establishes a framework for harmonised eco design requirements in products. The Directive (under Article 95 of the EC Treaty), is often quoted by the European Commission as a model of Better Regulation.

Our industry clearly supports the main features of the Directive, but it is now essential to achieve regulatory stability so that companies can work in a legally certain environment. Therefore the EuP Directive should not be revised at the present time.

As for the draft waste Directive (2006/12/EC), the industry is extremely concerned that the European institutions are again undermining the coherence of product related environmental legislation by allowing Member States to introduce different product design measures in a directive under Article 175 of the EC Treaty.

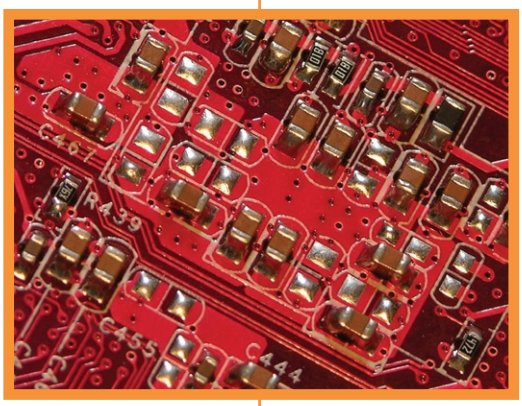
In the upcoming review of the WEEE Directive (2002/96/EC on Waste Electrical and Electronic Equipment), we encourage the Commission to consolidate the institutions' product design policy for the electrical engineering industry by deleting the unnecessary overlapping design requirement from WEEE, since this is also covered in the EuP Directive. Where national transpositions, however, have evidenced shortcomings of the WEEE Directive itself, due consideration should be given to fine-tuning the directive in such areas at EU level. We encourage the Commission to: focus on a harmonised application as far as possible throughout the EU; clarify and circumscribe the scope of the WEEE Directive; introduce a greater harmonisation for WEEE registration and facilitate reporting; ensure that no design aspect is obsolete or potentially conflicting and, if relevant, remove it.

In the RoHS Directive (2002/95/EC Restriction of certain hazardous substances) transpositions are quite divergent in different Member States. Some Member States, for instance, reject the New Approach understanding in the context of the putting products on the community market. We propose that the scope of RoHS should be fully harmonised and that the European Commission continues to put pressure on national governments to ensure a harmonised application of the directive. The introduction of new substance restrictions should only be undertaken in the framework of REACH.

4.3.4 Intellectual property rights

In the area of intellectual property rights (IPR), two issues need to be highlighted. The IPR regime in Europe needs to be improved and the electrical engineering industry needs support to fight all types of IPR infringement. Counterfeiting is a global and rising problem. In the electrical sector it raises significant problems of safety. The electrical engineering / electronics industry is also affected by trademark piracy. Proposed solutions include among others:

- Improved patent regulation in the EU with a balanced and affordable patent system.
- Making the respect of intellectual property rights a key element in trade discussions.
- More vigorous presence and intensified political dialogue in priority countries.
- Targeted market surveillance activities at the borders of the EU.



4.3.5 Standardisation

The two main challenges to the European standardisation are the fragmentation of the standardisation activities in new areas of standardisation and the need to reinforce a sectoral standardisation approach that will guarantee the future added value of standardisation. Both the EU and Member States' authorities must acknowledge the public nature of European standards, which goes beyond the short-term technical solutions that might be provided by fora and consortia standards.

Standardisation needs to be close to industry. Standardisation can only be a tool for competitiveness when it reflects the needs and the potential of the European industry. Issues like concentration of the market, experts' ratio, protection of intellectual property rights, average size of companies, define the way a sector contributes to and uses voluntary standards. The principles and rules of the European standardisation system have to remain applicable to all the sectors in order for them to benefit from the system (harmonisation, public nature, international dimension) but it should provide the necessary flexibility to address the different needs of the different sectors.

The European standardisation system, through the National Committees ensures certain essential requirements: all groups of interest have access to the standardisation process. This also ensures the participation of the SMEs; and the National Committees can ensure the harmonisation of the technical requirements by implementing identically European standards and withdrawing national conflicting ones. Standardisation can only be a tool for competitiveness when it reflects the needs and the potential of the European industry. Possible ways of achieving this include:

- To increase the knowledge of the European standardisation system and its benefits within EC and Member States authorities.
- To ensure that the European standardisation system provides enough sectoral flexibility to address the needs of the global market.

4.4 Challenges faced by the electrical engineering and electronics industry in export markets

The present section highlights the most important challenges and countries that the industry faces in its export markets. A more extensive description is provided in Annex 4.

4.4.1 China

Through the China Compulsory Certification (CCC) system our industry has found mandatory third party certification and on-site checks in facilities in the EU a tedious, expensive and burdensome measure. It furthermore facilitates illicit know-how transfer.

In the standards area, the main challenge is the decentralization of standardisation out of the traditional system. Only about 10% of Chinese standards are identical to ISO and IEC standards.

Contrary to its commitments, China has not signed the WTO public procurement agreement (GPA) yet. For China which is still dominated by government orders, this poses a great barrier on foreign suppliers. We therefore:

- Encourage the Commission to motivate China to align its own legislation to EU's RoHS as far as possible.
- Urge the Commission to encourage China to apply a lighter certification regime in particular for low risk products and to continue to push the Chinese authorities to improve and streamline the CCC procedures.
- Urge the Commission to encourage China to increase criminal enforcement of IPR violations. Administrative authorities have to be strengthened, databases developed to identify repeated offenders; penalties have to be increased to be deterrent enough.

4.4.2 U.S.A.

Compared to other areas of the world, there are fewer impediments to trade with the U.S.A. The very different regulatory system from that in the EU, with the different layers of Federal and State regulation and the system of agencies, however, renders the desirable convergence of the regulatory systems more complex.

In addition the fact that there are more than 800 accredited standards developers in U.S.A. makes it extremely difficult and costly to identify and address the relevant players in the standardisation arena. To this must be added the difference in conformity assessment procedures.

Industry also suffers from a lack of recognition and implementation of international standards. U.S.A. stakeholders, through the U.S.A. National Committee of the International Electrotechnical Commission (IEC), can contribute to more than 70% of the European Standards, which are identical to IEC ones. There is no reciprocity for European manufacturers in the use of IEC standards as a tool for access to the U.S.A. market.

- In its Transatlantic Economic Council discussions the EU would therefore do well to ensure a greater degree of regulatory convergence, including in the area of conformity assessment procedures.

4.4.3 South Korea

In Korea the trading relations in the electrical engineering sectors are characterised by a huge trade imbalance: Europe's trade deficit amounted in 2006 to €2.7 billion for electrical machinery and to €9.7 billion for telecommunication, sound-recording and reproducing equipment. Of all sub-sectors of the EU industry, electrical engineering is the one which suffers the highest deficit.

European companies face restricted access to the Korean market and experience technical barriers to trade. They have also filed anti-dumping complaints and anti-subsidy complaints against Korean producers. With regard to technical barriers to trade, the situation worsened in the last few years with the introduction of a new certification system and new electrical safety laws.

4.4.4 India

India is rapidly becoming a key market for the electrical and electronic industries. Import tariffs are very high for many equipment and capital goods products in India – from 30% to 40% – for a number of categories. Application and approval procedures are often neither transparent nor smooth. The setting-up of a business unit requires approvals that vary greatly from state to state.

- India has made a decisive step towards becoming a sought-after location for research and development based activities. We would appreciate the fulfilment of all WTO obligations under the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS agreement). To reach this goal, the Patents Bill and its implementation regulation need to be further developed.
- India should be seen as a priority country in negotiations on foreign trade agreements (FTAs): the Indian market has huge growth potential and therefore action should focus on the above mentioned issues, in particular the tariff issue.
- Indian standards and regulations are often not in line with international standards. The Bureau of Indian Standards (BIS) rules are complex, time-consuming and costly. Simplification of the procedures to give more transparency to these rules would be very welcome.

4.4.5 Russia

Importers have long cited slow clearance times, excessive red tape and corruption among customs officers as just some of the problems associated with getting shipments into Russia. Unstable tariff levels add to legal uncertainty and arbitrariness. Proposals for remedy are:

- Introduce simplified customs procedures for small players.
- Improve enforcement of the new customs code and provide training to customs officers, especially in the provinces.
- The expenditure of time with the required documents and permits for import, processing and export is often immense, so that fixed deadlines cannot be adhered to.

Another major obstacle to the electrical industry's exports arises from the Russian system of standards and certification. For instance safety certificates must be attached to imported consumer goods at the time of customs clearance. All products requiring certificates must be tested by a testing centre accredited by Gosstandart. Proposals from our industry include:

- The European Commission and European industry should drive for the introduction of the new "New Approach" for EU-technical harmonisation and its advantages for legislators and industry to the Russian authorities.
- The European Commission is encouraged to urge the Russian government to ensure actual implementation of new rules concerning certification and to facilitate delivery of know how on EU standards, technical harmonisation regulation and conformity assessment procedures.

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Annexes

(available on-line: http://ec.europa.eu/enterprise/electr_equipment/electra.htm)

Annex 1: Statistical analysis.

Annex 2: Full report of the work on the area of "Energy efficiency and CO_2 reduction as drivers of innovation".

Annex 3: Full report of the work in the area of "How to generate more growth in key European electrical engineering sectors".

Annex 4: Full report of the work in the area of "The internal and export markets of the industry".

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