Sustainability by Energy Efficiency

European Energy Efficiency Improvement in the Graphic Media Industry

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EEEI - European Energy Efficiency Improvement in the Graphic Media Industry

Huissen, The Netherlands, 2009
Developed within the European Energy Efficiency Improvement in the Graphic Media (EEEI) project 2007-2009

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Editor:
Energy Experts International B.V.,
The Netherlands 2009

Report preparation and writing:

This report has been jointly prepared and written by Dr. Anastasios E. Politis and Drs. Ed Wetzel, EEEI project partners. The report has been prepared in 2009 and based on the EEEI project data and results, as well as on a literature survey and references on Graphic Media, energy and the environment.
# Table of Contents

- Acknowledgments 4
- Summary of basic project data 5
- Executive Summary 6
- 1. Introduction 8
- 2. Sustainability, energy management and the environment 11
- 3. The graphic media industry– an overview 14
- 4. Energy efficiency for the graphic media industry - The EEEI project 18
- 5. Awareness on energy consumption and energy costs reduction 22
- 6. Tools for efficient energy management 36
- 7. The E-bag tool 37
- 8. Generic benchmark 43
- 9. Specific benchmark 44
- 10. Energy Efficiency Improvement Measures 46
- 11. Results 54
- 12. Lessons learnt 59
- 13. Recommendations for the attention of key decision makers 61
- 14. Future actions 64
- 15. References 65
Acknowledgments

The authors would like to thank all EEEI project partners, energy consultants, companies and industry federations that actively participated in the project.

Special thanks to Michael Dattner from the Bergische Universität Wuppertal and Michiel Steerneman, from Energy Experts International B.V.

We would also like to thank the Intergraf and EGIN organisations for their support.

Summary of basic project data
Name: European Energy Efficiency Improvement - EEEI

Location: Huissen, The Netherlands – Project coordinator Energy Experts Int. B.V.

Duration: 27 months from January 2007 until March 2009

Contract number: EIE/06/075/SI2.448796

Budget: € 1.391.887 (EU contribution: 50%)

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Key stakeholders: SMEs, European Graphic Media Industry, Intergraf, EGIN, National Printing Associations

Project partners:
- Handwerkskammer Münster, Germany,
- Bergische Universität Wuppertal, Germany;
- Heves County Chamber of Commerce and Industry, Hungary;
- ENVIROS s.r.o., Czech Republic;
- Energo Group S.A., Greece;
- Athens Technological Educational Institute, Greece

Purpose: Remove barriers to energy efficiency by visualising energy use and costs and promoting measures for reduction by SMEs.

Key results:
- European synthesis report on an inventory and assessment of energy efficiency, analysis of barriers and summarising best practice within SMEs in the partner countries
- Industry awareness paper tool, company awareness tool, benchmark tool for the industry, measure list, energy-management standard
- Results of benchmark
- Measure list concerning energy reduction potential
- Presentation material for workshops, conferences and news letters
Executive Summary

Energy is fundamental for our lives and substantiates all the functioning of society. Over the last few decades, the energy sector has changed drastically. The ever-increasing demand for energy, soaring oil prices, uncertain energy supplies from some areas of the world and fears of global warming are all challenges that are currently the subject of intense debate.

Further topics concerning environmental protection in terms of water and air pollution are also at the centre of international interest. In these topics the printing industry is already leading. This is demonstrated in the numerous innovations, which have led to considerable changes in the different printing techniques over the last few decades.

Many processes today are much more environmentally friendly than even 30 years ago. For the production of the same printing product fewer chemicals are needed, and environmentally and health friendly inks, additives as well as cleaning agents are available. Actually, printing plants were among the first that introduced ecological management systems.

Thus, it seems an obvious step to make the lowering of energy consumption, due to the rising costs for energy and global warming, a priority as mentioned above.

Regarding this issue a group of organisers and experts, from the energy consultancy and the graphic media industry, joined forces into a common innovative project on energy efficiency. The project focused on the support of small and medium sized enterprises (), since they are the vast majority of the graphic media industry. The project submitted at the European Commission and was partially financed by the EU under the name:

European Energy Efficiency Improvement in the Graphic Media Industry EEEI Project.

The principal objectives of the project were:

- Removing barriers to energy efficiency;
- Promoting reduction of energy use and costs of SMEs;
- Supporting SMEs with energy tools, audits, consultancy and training

The main workpackages were the following:

- Inventory and assessment of energy efficiency and barriers and good practice
- Development and testing of tools
- Consultancy of SMEs
- Communication and dissemination of results by national workshops, European conference, website, materials

Within the scope and the objectives of the project, the study was based on an extended inventory and assessment survey among graphic media in the following five European countries: The Czech Republic, Germany, Greece, Hungary and the Netherlands. In this survey, the issues of
environmental protection, energy consumption and its reduction as well as the management procedures on energy efficiency and barriers have been examined and investigated.

A first step in the survey was the investigation on the awareness on environmental and energy issues of the Graphic Media in the five project countries. This has been conducted with extended interviews with the companies and the use of a structured questionnaire.

The data collected and analysed led the project partners to create a number of management tools on energy efficient management for the SMEs, specifically oriented for the Graphic Media Industry.

During the project the following tools were developed:

- **Industry Awareness Tool**
- **SME Awareness Tool**
- **Energy Benchmark Analyzer Graphic Media - E-BAG Tool including:**
  - Generic Company Benchmark
  - Generic Energy Reduction Measures
  - Generic Company Energy Report
  - Specific Company Benchmark
  - Measure List
  - Specific Energy Reduction Measures
  - Specific Company Energy Report

The benchmark has been implemented in more than a hundred companies and resulted in the final results of the project: the potential direct annual emission reduction of CO2 and the annual reduction of energy and energy costs. Actual results on energy reduction and costs and CO2 emission as a direct outcome of the project have been:

- an energy reduction of approximately 55 TJ (105 SMEs) each year (goal: 35 TJ)
- the reduction of CO2 emission by 105 of about 4596 ton each year (goal: 2455 ton)
- the direct reduction of energy costs at 1.000.000 EUR (105 SMEs) each year (goal: 490.000 EUR).

**Final Results of Benchmark, after finishing the action**

After finishing the action, a final measurement on May 22 2009 reported as final results of benchmark:

- a total of 105.815 GJ per year of energy reduction
- a total of 6.866 Ton per year of reduction of CO2 emission.
- a total of 1.670.851 EUR per year of decreasing energy costs.
1. Introduction

Energy is fundamental for our lives and substantiates all the functioning of society. Over the last few decades, the energy sector has changed drastically. The ever-increasing demand for energy, soaring oil prices, uncertain energy supplies from some areas of the world and fears of global warming are all challenges that are currently the subject of intense debate1.

Further topics concerning environmental protection in terms of water and air pollution are also at the centre of international interest. In these topics, the printing industry is already leading. This is demonstrated in the numerous innovations, which have led to considerable changes in the different printing techniques over the last few decades. Many processes today are much more environmentally friendly than even 30 years ago. For the production of the same printing product fewer chemicals are needed, and environmentally and health friendly inks, additives as well as cleaning agents are available. Actually, printing plants were among the first that introduced ecological management systems.

Thus, it seems an obvious step to make the lowering of energy consumption, due to the rising costs for energy and global warming, a priority as mentioned above.

Regarding this issue we supported small and medium sized enterprises (SMEs) within the scope of the European Energy Efficiency Improvement Project in the Graphic Media Industry. The study has been based on an extended survey among graphic arts in the following five European countries: The Czech Republic, Germany, Greece, Hungary and the Netherlands. In this survey, the issues of environmental protection, energy consumption and its reduction as well as the management procedures and barriers on energy efficiency have been investigated.

The data collected and analysed have been used for tailoring tools exactly fitted to the graphic media industry to reach the final objectives of the study: The potential direct annual emission reduction of CO2 and the annual saving of energy and energy costs.

Project Objectives and hypotheses for investigation:

- Use of energy is often hidden and not a serious subject of the policy of SMEs
- These appear as the main barriers for SMEs in the Graphic Media Industry for reducing their use of energy
- Regional differences within the graphic media industry occur on 3 fields: physical climate, culture and costs
- The project intended to make SMEs aware of the opportunities, remove barriers and improve energy efficiency within the industry
Target groups

Target groups of the project were:
- Small and medium sized companies of the graphic media industry in the EU member states.
- Actively engaged by information, visits, benchmarks, measure lists, concrete energy reduction measures and feedback.
- Goal: 100 SMEs engaged in the 5 project countries

Key results of the EEEI project:

- European synthesis report on an inventory and assessment of energy efficiency, analysis of barriers and best practice within SMEs in the partner countries
- Industry awareness paper tool, company awareness tool
- “The Energy Benchmark Analyzer Graphic Media (E-BAG)” - Benchmark tool for the industry, including generic and specific benchmark reports and specific energy measures
- Presentation materials for national workshops
- Consultancy of SMEs on energy efficiency
- Results of benchmark: completed with 100 companies
- Measure list concerning energy reduction potential
- Literature developed
- Dissemination of results

Project work packages

The project consisted of the following six work packages:

1. Management
   This work package includes the total project management during the 27 months. Aim is coordination of the project activities, consultation and information exchange, guarding of planning and budget, internal and external communication and so on.

2. Inventory and Assessment
   An inventory takes place of the energy situation in the participating countries. Starting with country level and then zooming in at company level. All relevant aspects are part of the inventory, like saving options, organisation, parties and legislation. The result is an overview of barriers but also an overview of good practices/good results; this is the input for work package 3 and work package 5.

3. Development and Testing
   Tools developed to settle the observed barriers on the basis of the previous results. There will be interchange experiences of the knowledge from the participants in the consortium. If it works out successfully, it can possible also be applied to other companies. The tools are tested and the experiences herewith are mutually exchanged.

4. Consultancy of SMEs
   in this work package concrete energy measures have been worked out and realized. Companies got insight in the scope of actual energy matters, processes, consumption and
costs. Such an action leads to certain measures to be taken by the company, after they have been advised about the possibilities for energy measures. Files from the individual companies are collected to use in the benchmark.

5. **Communication and Dissemination**
   This work package consists of two parts:
   a. the individual company results become processes to a benchmark tool and a measure list.
   b. dissemination of the outcome of the work packages 2, 3, 4 and 5a to other industries on EU-level.

6. **Common Dissemination Activities.**
   At the request of the EU time is reserved for e.g. presentations concerning the project, the progress and the results.
2. Sustainability, energy management and the environment

Regulations, tasks and promotions

Nearly all governments in the world set regulations or participate in international agreements to promote a sustainable energy management and an eco-friendly economy. To get a better overview it is helpful to see, which European regulations or projects exist.

Kyoto Protocol
The Kyoto Protocol is an agreement made under the United Nations Framework Convention on Climate Change (UNFCCC). Countries that ratify this protocol commit to reduce their emissions of carbon dioxide and five other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases. The Kyoto Protocol now covers more than 160 countries globally and more than 60% of countries in terms of global greenhouse gas emissions. Kyoto is a 'cap and trade' system that imposes national caps on the emissions of Annex I countries like the Czech Republic, Germany, Greece, Hungary and The Netherlands. On average, this cap requires countries to reduce their emissions 5.2% below their 1990 baseline over the 2008 to 2012 period. Although these caps are national-level commitments, in practice most countries will devolve their emissions targets to individual industrial entities, such as power plant or paper factory. An example of a 'cap and trade' system is the unrelated-to-Kyoto 'EU ETS'. Other countries may follow suit in time. Detailed information about the Kyoto Protocol is available at: http://www.unfccc.org

EU ETS (European Union Greenhouse Gas Emission Trading Scheme)
The European Union Emissions Trading Scheme is the largest multi-national, multi-sector, greenhouse gas emissions trading scheme in the world and is a main pillar of EU climate policy. Under the EU ETS, large emitters of carbon dioxide within the EU must monitor and annually report their CO2 emissions, and they are obliged every year to surrender an amount of emission allowances to the government that is equivalent to their CO2 emissions in that year. The companies get their allowances for free from the government, or may purchase them from other companies, traders or the government. If a company has received more free allowances than it needs, it may sell them to another. In order to make sure that the CO2 emissions are reduced, the EU must make sure that the total amount of allowances that are given to the companies is less than the amount that would have been emitted under a business-as-usual scenario. The total quantity to be allocated by each Member State is defined in the Member State National Allocation Plan (NAP). The scheme, in which all 25 member states of the European Union (since 2007 the EU consists of 27 member states) participate, commenced operation on 1 January 2005. Detailed information about the EU ETS is available at:
EMAS (Eco-Management and Audit Scheme)
The Eco-Management and Audit Scheme is the EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environmental management system and report on their environmental performance through the publication of an independently verified environmental statement. They are recognised by the EMAS logo, which guarantees the reliability of the information provided.
In all countries participating in the EEEI-Project there are EMAS certified companies. Detailed information about EMAS is available at: http://ec.europa.eu/environment/emas

EN ISO 14001
The ISO/EN ISO 14001 is a European accepted standard that sets out how to implement an effective Environmental Management System (EMS). The standard is designed to address the delicate balance between maintaining profitability and reducing environmental impact. The ISO/EN ISO 14001 and EMAS share the same objective to provide good environmental management. Often EMAS and the ISO/EN ISO 14001 are seen as competitors, but this is a fallacy. Companies which already are ISO/EN ISO 14001 certified, have it easier to register for EMAS because an EMAS certification includes the requirements for an ISO/EN ISO 14001 certification.

Cogeneration (Combined Heat and Power - CHP)
Cogeneration is the use of heat engine or a power station to simultaneously generate both electricity and useful heat. Conventional power plants emit the heat created as a by-product of electricity generation into the environment through cooling towers, as flue gas, or by other means. CHP or a bottoming cycle captures the by-product heat for domestic or industrial heating purposes, either very close to the plant, or – especially in Scandinavia and Eastern Europe – for distribution through pipes to heat local housing.
For small and medium-sized businesses the installation of a "Micro cogeneration" could be profitable, instead of burning fuel to merely heat space or water, some of the energy is converted to electricity in addition to heat. This electricity can be used within the company, or sold back into the electric power grid.
The European Association for the Promotion of Cogeneration (COGEN Europe) was created in 1993 to reflect the clear need for greater co-operative efforts at a European level to realise the full potential for cogeneration. Nowadays the COGEN Europe’s membership includes more than 160 power companies, power authorities, national cogeneration associations, suppliers and other organisations involved in cogeneration in 30 countries. Also in all EEEI-Project participating countries there are companies which are members of COGEN Europe.
Detailed information about CHP and COGEN Europe is available at: http://www.cogen.org

ECCP (European Climate Change Program)
At European level a comprehensive package of policy measures to reduce greenhouse gas emissions has been initiated through the European Climate Change Program. Each of the 25 member states of the European Union has also put in place its own domestic actions that build on the ECCP measures or complement them.
The immediate goal of the First ECCP was to help ensure that the EU meets its targets for reducing emissions under the Kyoto Protocol. The aforementioned ET ETS is one of the most important measures, of nearly 30, of the ECCP.
The Second European Climate Change Program (ECCP II) was launched in October 2005 at a major stakeholder conference in Brussels.
Detailed information about ECCP and ECCP II is available at:
http://ec.europa.eu/environment/climat/eccp.htm
3. The graphic media industry – an overview

The Graphic Media Industry in the 25 European countries comprises some 120,000 firms and employs some 940,000 people. The turnover in the printing industry of the 15 EU is estimated at about 82 billion EUR. The industry throughout Europe consists mainly of small enterprises, as 85% of them employ fewer than 20 persons.

The printing industry has traditionally put information on to paper products, whether to inform or for pleasure. The main challenge for the future is to ensure the successful integration of the printing industry into the global ‘communication’ system. The industry is characterised by small and medium-sized firms who have always combined creativity with industrial production (Intergraf, 2009).

As a user of paper and board, the printing industry can be seen as an important downstream activity of the ‘wood cluster’ which comprises the forest industry, paper-making, printing, packaging, graphic communication and publishing industries.

However, the ‘printing industry’ is also an important representative of the media and information industries. The industry has changed over the past decade, in particular moving from analogue processes to ‘digital workflows’ in which content is received and processed in electronic form. From the reception of electronic ‘manuscripts’ with images through the pre-press area to the automatic control of printing presses, new technologies can be seen to be having their influence. Workflows are fully digital when the output occurs on digital printers. A wide variety of technologies are available to graphic companies for the production of printed products and to help them extend their scope of activities into such things as CD-ROM or website production.

Innovations in equipment and graphic machinery have put the printing industry in the forefront of technological progress. Equipment has therefore a major impact on the type, the quantity and the flexibility of the work carried out, as well as on the professional skills and the organization of the work in general. Many aspects of the print production process are now commonly automated, measured and controlled by computers.
Structure of the graphic media industry

The graphic arts industry is characterised by a wide variety of areas of production, ranging from art and design applications to manufacturing and production processes. Print media production includes a large range of different product groups, most notably books, newspapers, periodicals, advertisements, brochures and catalogues. Packaging is another important segment and other significant types of printed matter are labels and posters. The main applications are publishing, advertising, and packaging.

The traditional categorisation of the stages of graphic arts production is:

- pre-press
- printing or press
- post press or finishing.

Many traditional graphic arts companies specialise in one of these principal production categories. Products require slightly different machinery, and so it is more efficient and profitable for companies to be oriented towards a specialised area of printing. However, there are also companies that carry out all the stages of printed matter production, including pre-press, printing and finishing.

Another company categorisation is along the lines of specific printed products. Specialisations include:

- magazines,
- cartons (for food and other items),
- stationery, labels,
- print on metal (such as drink cans),
- catalogues,
- books,
- high quality colour printing (brochures, cards, fine art reproduction),
- newspapers,
- security printing (for bank notes and bond issues).

Traditionally, production areas have concentrated on printing although, increasingly, print-oriented companies are focusing on ‘total solutions’ for their customers. Nowadays, they may also design the items they print, and offer additional services in the visual communication field, advertising or web design.

Changes in the graphic arts and media industry

Nowadays, the graphic, media industry is coping with structural changes caused by rapid technological developments. These technological developments affect not only production but also the structure of the enterprises, the products, and their market position. There is a noticeable move from being manufacturing oriented to becoming oriented towards providing service.

One of the main characteristics of change is the wide application of electronic processing environments and the processing of not only printed but also electronic media, such as web sites and multimedia applications. Digital printing is another technology that influences and accelerates...
the structural changes taking place currently within the industry and, consequently, the companies and the personnel involved.

The above-mentioned changes are caused by increasing competition both at the local and global level. The competitive advantage of the graphic media industry relies on the quality of the products or services offered.

Substantial technological developments have taken place within the graphic media industry, primarily during the last decade of the 20th century, especially, innovations and improvements in pre-press and printing, that affect the existing structure of production workflow, the technological processes applied and the working environment.

Reorganisational strategies have been widely carried out in an attempt to adapt the industry to the new conditions. Initially this was characterised by investment in new equipment and systems, followed by significant changes in production workflow. A second step included organisational and administrative structural changes and application of management strategies and activities in a wide range of operations and policies at company level. These actions were aimed to a new position and orientation in the rapidly changing information market and communication industry and to the strengthening of the industry towards the competition with the new electronic media (Politis, 2004, Intergraf, 2007).

Environment, sustainability and the Graphic Media Industry

The European Graphic Media Industry is an industry which has only a marginal impact on the environment. The industry is devoting increased resources to meeting the stricter environmental requirements. For example, it has invested large amounts of money to limit emissions to the air (VOCs) caused by web-offset and gravure printing, to improve waste water management and to encourage the recycling of waste. In some EU-countries the graphic industry federations collaborate closely with government departments to agree on the best measures for environmental protection. At international level, the international federation for the graphic industry, INTERGRAF (www.intergraf.eu), is co-operating with the EU-Commission to define appropriate directives in this area.

The Graphic Media Industry traditionally has put information on to paper products, whether to inform or for pleasure. The main challenge for the future is to ensure the successful integration of the printing industry into the global 'communication' system. The industry is characterized by small and medium-sized firms which have always combined creativity with industrial production. The European Graphic Media Industry has an energy consumption of 420 PJ and an emission of 30 million Ton CO2. The European Graphic Media Industry needs to reduce energy consumption to stay competitive and contribute to achieving the Kyoto commitments. Finally, the Graphic Media Industry is spread all over Europe, has a great uniformity of products and processes and a high potential for energy reduction.
Energy efficiency and the graphic media industry

Changes in the graphic media industry cause new requirements for the companies. Particularly, middle and upper management and ownership of graphic arts face new tasks that are added in daily concerns of the companies. To name some we nowadays deal with workflow management, digital asset management, colour management, etc., etc.

The continuous increase of management tasks create the need to set the framework for a modern and efficient management of old and new tasks. Considering, however that, the protection of the environment is gaining in importance due to the dramatic changes of the climate that are experienced, the issues of energy consumption and its efficient management are considered of high importance towards the direction of reducing energy resources by the graphic media industry.

The question posed is to investigate whether the environmental protection and specifically the energy issue is a matter of importance for the graphic media industry. Therefore, it is important to draw attention to and investigate the current situation on environmental issues and in particular the energy efficiency of the European graphic media industry. More specifically a principal objective of the present study was to investigate the degree of awareness among the of the graphic media industry in the EU member states concerning the reduction of energy consumption. The study has been based on an extended survey among graphic arts in the 5 European countries that participated in the EEEI project.

Achieving this data has been implemented via running the above mentioned case study research in Czech Republic, Greece, Germany, Hungary and The Netherlands. With the aid of the case study, the examination of an as-is analysis of these countries has been taking place. The survey included a collection of energy relevant data from the countries and the industry sectors and in particular from graphic media companies. These data have been used for tailoring tools fitting exactly to the graphic media industry.

Thus the project intended to generate transparent key data and indicators, which are so detailed that in apparently different circumstances comparable components can be described. This is a very important precondition for establishing changes required in current management structures to apply an energy efficient management in the graphic media industry in Europe.

As such the project aimed among other objectives, to:

- investigate awareness on energy issues
- to collect and analyse generic and specific data
- create tools for efficient energy management and
- to make energy matters transparent and motivate people, industry and companies – as active and responsible members of the society – to protect the environment and to reduce the energy consumption and costs.
4. Energy efficiency for the graphic media industry - The EEEI project

Since the graphic media industry in Europe mainly consists of, this industry has to become a knowledge industry and develop new management, production, communication and service concepts in order to survive. This objective can only be fulfilled by creating surplus value for their customers and present themselves as a full service partner for all graphic media services. Nowadays, the subjects on environmental protection and optimized energy efficiency become increasingly significant.

The purpose of this report is to draw attention to and investigate the current situation on environmental issues and in particular the energy efficiency of the European graphic media industry. The study originates from a European Union funded European Energy Efficiency Improvement (EEEI) project.

More specifically, a principal objective of our study is to investigate the degree of awareness (owners/employers and employees) among the of the graphic media industry in the EU member states concerning the reduction of energy consumption.

This issue needs to be addressed not only as a process towards the protection of the environment by for example reducing greenhouse gas emissions, but also as a matter for management. Thus this can be considered an innovative approach, combining the visualisation of the often hidden use of energy and the provision of the technical know-how to reduce it with the necessary management structures.

Furthermore, our intention was to propose methods to visualise the awareness, to develop benchmark tools for the industry with an overview over key figures (financial, technical, management) and to provide an energy-management standard as a suggestion on how energy can become a part of management.

The study was based on an extended survey among graphic arts in 5 European countries. Within the survey, various matters related with environmental protection, energy consumption and its reduction and the management procedures on energy efficiency have been initially investigated. The data collected will be used in future study for tailoring tools fitted exactly to the graphic media industry.

Based on the knowledge, built up about the energy situation of the industry, the project wants to draw up an inventory and make an assessment of the specific energy situation, awareness and knowledge of measures. It is the basis for the correct way to approach the relevant contracting parties and to develop the right tools. The result is not only usable for this project, but can also generically be used for other projects or targets. In this work package the energy situation of the participating country will be listed on the following levels: Country, Industry, and Company.
In addition to the standard information about energy consumption, reduction potential, and so on at country and industry level, the next key questions will be asked to SMEs:

- Is energy an issue?
- Can I do something about my energy consumption?
- Do I know the measures and the effects?

The European Energy Efficiency Improvement Project (EEEI – www.eeei.info)

For this purpose, the European Energy Efficiency Improvement project intended to remove barriers for SMEs in the Graphic Media Industry for reducing their use of energy by visualising the use and costs of energy and promoting the reduction of energy and its costs in the partner countries. The project partners acted in visualising the energy use and costs of SMEs by conducting a customised awareness campaign, development and application of a set of benchmarking tools and measures as well as promoting voluntary agreements. These actions have been combined with the following methods to reduce use of energy: an energy management system, aimed at reducing energy consumption by expert-training of companies, financial benchmarks and preparing and using tools, including action plans.
Project workflow

The workflow of the project in order to reach the targeted final deliveries is described as follows:

Phase 1: Research and analysis – building up knowledge and network

This phase involved all partners in the consortium and all areas that should be covered in the final deliverables. It has focused on research on energy efficiency in the branch in the partner-countries and analysing obstacles for energy efficiency improvement within SMEs, as well as summarising best practice in the branch. This has been achieved by a general overview of results of nationally performed research and best practice descriptions from each participating country in the form of short case-study examples. (WP2)

Important parts of this project phase were also the setting of project management and co-ordination, systems for information and dissemination and arrangements for a systematic, formative evaluation. (WP 1)

Phase 2: Development, testing and training

This phase has been focused on developing and testing a tool/instrument for assessment and benchmarking of energy efficiency of SMEs within the branch. The development work has been carried out by a work package team (WP team) consisting of a lead contractor and selected experts, competent partners of the consortium. In general the work process has been characterised by:

- defining in detail the area and contents of the tool; conditions for development and learning, role of important actors, processes and critical incidents, supportive structures
- construction of the assessment tool; important/strategic parameters and how to measure and evaluate them
- testing the constructed tool in some pilots and benchmarking

Consultants of the project partners have been trained to use the tool and share the build-up knowledge in order to mobilise and consult the SMEs in their countries on their energy efficiency policies. (WP3)

Phase 3: Consulting SMEs, European dissemination

In the final phase the tool has been integrated in the bench-marking and quality assured through using in real life for consultancy of SMEs by consultants of each partner in the consortium. The assessment tool has been presented on the project website and at several national and international events - scientific conferences, other conferences, exhibitions and national events, focusing mainly at the companies and stakeholders such as Employers’ federations and associations and organisations of the graphic media sector. For dissemination of project results a dissemination strategy has been developed (see WP Dissemination).

Expected results
The deliverables of the project were the following:

- project website (WP1)
- first and second progressive report (WP1)
- evaluation report (WP1)
- synthesis report of obstacles and best practice in the business with both general country-descriptions and case-descriptions/practical examples (WP2)
- a general structure and input for the development in phase 2 (WP2)
- prototype of the European energy efficiency improvement tool (WP3)
- synthesis of test results and benchmark results (WP3)
- final report on consultation of SMEs and European dissemination of tool and project knowledge within the graphic media branch (WP4)
5. Awareness on energy consumption and energy costs reduction – hypotheses and strategic directions

Energy and environmental awareness

General topics concerning the EU-wide energy and environmental awareness
This general topic was analysed by The Gallup Organization for Energy and Transport out of Hungary in the spring of 2007. EU-wide research on issues related to the EU energy policy was made. This survey was conducted in all 27 Member States. The fieldwork during which 25,800 European citizens were interviewed was carried out until February 2007.

The main findings are presented in the following bullet points:

- Sixty-two percent of EU citizens believe that the best way to tackle energy-related issues is "through measures agreed on at the EU level" as opposed to "measures agreed on at a national level" (an option selected by 32%).
- In 22 Member States, the majority prefers EU decision-making with regard to energy issues. Those preferring decision-making at the national level form the majority in some Eastern Member States: the Czech Republic, Bulgaria, Estonia, Latvia and Slovakia.
- Half of the EU’s citizens are “very much” concerned about the effects of global climate change, and a further 37% say that they are not indifferent about the issue. The level of concern increases significantly as we look further south: people in Spain and Cyprus are the most worried. Citizens are well aware that the way they consume and produce energy in their country has an effect on the climate: only some 13% of Europeans believe that their energy-related activities do not (or do not really) have an impact on the climate.
- EU citizens are quite certain that energy prices will increase significantly over the next decade. More than seven out of 10 Europeans feel that they will need to change their energy consumption habits in the next decade, and that they will need to install energy-saving heating, lighting, cooling etc. equipment to keep up with rising prices and to comply with regulations. Citizens believe that it is essential to have a real choice in the energy market (85%), and that environmental concerns also play a role in their choice for free competition. Currently, less than two in ten EU citizens say they do not pay attention to the energy consumption of the household appliances they buy, while almost half of EU citizens reportedly pay a lot of attention to such concerns. When asked what actions citizens would welcome most from authorities in helping them cope with future energy challenges, they most often indicated monetary assistance to upgrade the energy-efficiency of their living space. It is also very clear that citizens expect their governments to intervene. The desired forms of intervention (e.g. tax incentives, funding research, banning products and technologies that are not up to current energy efficiency standards) vary from Member State to Member State. The bottom line is that only 2% of citizens believe that their government should not do anything about this.
- As mentioned above, a significant majority of Europeans prefer the EU to coordinate decision making with regard to energy issues. Several policy initiatives of the EU also enjoy
the support of the majority (and sometimes the overwhelming majority) of citizens. Eighty-three percent agree that in each Member State, the EU should set a minimum percentage of energy that must come from renewable sources. The European public is still strongly opposed to the use of nuclear power; those who are worried about climate change are even more fiercely opposed. At the same time, Europeans almost unanimously (92%) back the introduction of common, high safety requirements for all nuclear installations in the EU. Citizens would definitely prefer the EU to negotiate energy supplies and prices for all Member States (65% vs. 26% who would prefer their government to act independently), although in Bulgaria and Latvia the majority is against such centralisation (in Latvia, only marginally). Europeans expressed a strong level of solidarity on the issue of energy: almost eight out of ten EU citizens agree that in the case of a sudden shortage of oil and gas, the affected Member State should be able to rely on the reserves of other EU countries; only 17% are opposed to this.

The EEEI Project survey on awareness

In order to extract data regarding the awareness of the graphic media industry on environmental and energy consumption issues, an extended survey among graphic media companies has been developed and implemented. The survey took place in 5 European countries and included interviews and answers to a questionnaire. The questionnaire has been directed towards the investigation of graphic media companies concerning the energy situation, policies and actions in energy efficiency. In order to obtain more accurate data, we have spread these companies over different printing methods and technologies used by the companies.
The list presented in Table 1 gives an idea, how many companies of each method of printing technology are taken into account in our investigation. The list is itemised by printing process type as the main criterion for each country. We have decided to distinguish the companies between sheet-fed offset printing (including packaging printing), web-fed offset printing (heat-set, cold-set, newspapers and commercial printing), flexography printing (including narrow-web), gravure printing, silk-screen printing, digital printing and book-binding into account for our study.

<table>
<thead>
<tr>
<th>Process type</th>
<th>Details / technical or other differences / keywords (remark: this list has no logical structure)</th>
<th>Try to contact per group</th>
<th>alternatively try to contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet-fed offset</td>
<td>- Oxidative drying</td>
<td>2 – 5</td>
<td>5 – 8</td>
</tr>
<tr>
<td>Printing</td>
<td>- UV drying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web-fed offset</td>
<td>- Newspaper Printing</td>
<td>2 – 3</td>
<td></td>
</tr>
<tr>
<td>Printing</td>
<td>- Heatset Offset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexography Printing</td>
<td>- Solvent based inks</td>
<td>2</td>
<td>5 – 6</td>
</tr>
<tr>
<td></td>
<td>- Water based inks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- UV inks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book-binding</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Gravure</td>
<td>- Solvent based inks</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Water based inks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- UV inks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Package printing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen Printing</td>
<td>- Fabric/textile printing</td>
<td>2 – 3</td>
<td>4 – 5</td>
</tr>
<tr>
<td></td>
<td>- All other substrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital printing</td>
<td>- Copy shop</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- book on demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- large format printing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact over all:</td>
<td></td>
<td>15 – 20 companies per country</td>
<td></td>
</tr>
</tbody>
</table>

*Table 1: Categorization of companies to be interviewed regarding energy issues*

The survey has been directed to small and medium sized enterprises according to the European rule of a maximum of 250 workers (although some companies that have responded to the survey extend this limit).
The survey started in the beginning of April 2007 within the graphic media industry in the five countries participating at the EEEI project: Czech Republic, Hungary, Germany, Greece and The Netherlands and ended in the beginning of July 2007. All interviews have been done in the corresponding national languages, so five questionnaires were made on the basis of the following English version. In order to generate comparable answers, we decided to work preferably with questions that can be answered with “yes”, “no” or “intended”.

The structure of the questionnaire includes an introduction wherewith, we want to point out our intention to sensitize our branch to the increasingly significance of environment protection and optimised energy efficiency as it is shown in Picture 1.

**European Energy Efficiency Improvement Project**

The subjects on environmental protection and optimised energy efficiency become increasingly significant. The purpose of our project is to draw attention to and investigate the current situation on environmental issues and in particular the energy efficiency of the European Graphic Arts industry. More specifically a principal objective of our study is to investigate the degree of awareness (owners/employers and employees) within the SMEs of the graphic media industry in the EU member states concerning the reduction of energy consumption.

This issue needs to be addressed not only as a process towards the protection of the environment by for example reducing greenhouse gas emissions, but also as a matter for management. Thus this can be considered in an innovative approach, combining the visualisation of the often hidden use of energy and the provision with the technical know-how to reduce it with the necessary management structures.

Furthermore, our intention is to propose methods to visualise the awareness of SMEs, to develop benchmark tools for the industry with an overview over key figures (financial, technical, management) and to provide an energy-management standard as a suggestion about how energy can become a part of management.

To reach these aims we have to make this start up interview within our industry to get basic data for the tailoring of tools fitted to the needs of our SMEs. We kindly ask you to fill in our questionnaire and thank you in advance! You can send us your completed questionnaire by clicking the button [send information] at the end of this document.

For further remarks, proposals and ideas please use the email [where with your answers will be transmitted].

*Picture 1: Introduction to the EEEI questionnaire*

Furthermore, to get well-defined relations, the second page starts with a field for the country name, where the interviewed company comes from. This is followed by the name and the address field completed by name and position of the contact person within the company as it is presented in Picture 2:
Finally, in Picture 3 the actual 22 questions concerning energy efficiency and environmental matters are presented:
Picture 3: Actual questions on energy efficiency

The questionnaire has been distributed to 96 companies in the 5 countries. Data have been obtained from 67 companies.

5.1 Results – general data

The survey in the 5 countries: Czech Republic, Hungary, Germany, Greece and The Netherlands, resulted in 67 questionnaires from a total of 96 companies registered to participate to the survey, a quite satisfactory response rate of 70% of the companies. In Table 2, the data from the 67 companies are illustrated regarding the number of companies per country, the total number of employees and the average number of employees per country.
Table 2: General data from the 67 companies that responded to the survey - Number of companies per country, total number of employees and the average number of employees per country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Companies</th>
<th>Employees</th>
<th>Average per Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZ</td>
<td>8</td>
<td>378</td>
<td>47</td>
</tr>
<tr>
<td>DE</td>
<td>19</td>
<td>1201*</td>
<td>75</td>
</tr>
<tr>
<td>GR</td>
<td>14</td>
<td>566</td>
<td>40</td>
</tr>
<tr>
<td>HU</td>
<td>8</td>
<td>1180</td>
<td>147**</td>
</tr>
<tr>
<td>NL</td>
<td>18</td>
<td>1208</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Only 16 companies provided data on the number of employees
**Two out of the 8 companies from Hungary employ 500 people

Furthermore, the survey resulted in the following distribution of printing technologies used by the companies, as it is presented in Table 3.

Table 3: Distribution of printing technologies used by the companies

<table>
<thead>
<tr>
<th>Printing technology used (plus book-binding)</th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet-fed offset printing</td>
<td>6</td>
<td>17</td>
<td>9</td>
<td>6</td>
<td>13</td>
<td>51</td>
</tr>
<tr>
<td>Web-fed offset printing</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Flexography printing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Rotogravure printing</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Silk-screen printing</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Digital printing</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>Production book-binding</td>
<td>7</td>
<td>6</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>
As it can be derived from the figures in Table 3, many companies use more than one printing technology. Sheet-fed offset printing is dominating, followed by digital printing machinery and book-binding. The most common combinations between the technologies are:

- Sheet-fed offset printing + production book-binding (more combinations)
- Sheet-fed offset printing + digital printing + production book-binding
- Sheet-fed offset printing + digital printing
- Flexography and rotogravure printing
- Sheet-fed offset printing + web-fed offset printing (less combinations)

It is worth to state that only 3 companies are pure book-binding companies. In addition, 3 out of 6 flexography and rotogravure machineries are combined in packaging printing companies for printing of flexible packaging substrates – all of them in Greece.

5.2 Results - Tables with the responses from the companies in the 22 questions on energy subjects

In the following part of the report the answers per question and per country regarding the awareness of the companies to energy issues, policies, actions and expectations are illustrated. In some cases there were no answers provided, however, this does not affect the overall structure of the outcomes from the survey. It must be also noted that, in some cases and in particular in the case of Greece, the majority of the companies has combined the answer “no” with the answer “intended” in certain questions. This has been taken into account as it regards the analysis of the outcomes.

1. Do you have any idea about your energy efficiency possibilities?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>11</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>33</td>
</tr>
</tbody>
</table>

2. Is there a staff member on energy matters in your company?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>15</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>Intended</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
</tbody>
</table>

3. Do you give energy saving information to your employees?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>10</td>
<td>23</td>
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<tr>
<td>No</td>
<td>6</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Intended</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>
4. Do you develop energy saving measures in your company?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
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<tbody>
<tr>
<td>Yes</td>
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<td>2</td>
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<td>6</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>Intended</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

5. Is energy efficiency an issue when you buy new machinery?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>15</td>
<td>47</td>
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<tr>
<td>No</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Intended</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

6. Do you spend a part of your yearly budget on energy saving?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
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<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>17</td>
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<td>10</td>
<td>5</td>
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</tr>
<tr>
<td>Intended</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>17</td>
</tr>
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</table>

7. Are your customers interested in ecological products?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
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<tr>
<td>Yes</td>
<td>3</td>
<td>4</td>
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<tr>
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<td>12</td>
<td>0</td>
<td>2</td>
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<td>12</td>
<td>13</td>
<td>4</td>
<td>4</td>
<td>35</td>
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</tbody>
</table>

8. Are you interested in ecological products?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
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<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>17</td>
<td>14</td>
<td>7</td>
<td>18</td>
<td>62</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

9. Do you have an environmental management system?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
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<td>2</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>
10. Do you have an eco-management and audit scheme certification (EMAS)?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
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<th>GR</th>
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<th>NL</th>
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<td>5</td>
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<td>6</td>
<td>0</td>
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</tbody>
</table>

11. Do you have an ISO-14001 certification?

<table>
<thead>
<tr>
<th></th>
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<td>Intended</td>
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<td>1</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

12. What is your yearly energy consumption in MWh?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data provided</td>
<td>3</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Data not available</td>
<td>5</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td>0</td>
<td>29</td>
</tr>
</tbody>
</table>

13. What are your yearly energy costs in Euros?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
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<tbody>
<tr>
<td>Data provided</td>
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<td>12</td>
<td>7</td>
<td>5</td>
<td>18</td>
<td>46</td>
</tr>
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<td>7</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>21</td>
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</tbody>
</table>

14. How do you measure your production output?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
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</thead>
<tbody>
<tr>
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<td>9</td>
<td>13</td>
<td>3</td>
<td>18</td>
<td>44</td>
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<td>7</td>
<td>10</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

15. What is your total energy consumption per amount of printed paper in Wh?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
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<tbody>
<tr>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>7</td>
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<tr>
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<td>7</td>
<td>18</td>
<td>13</td>
<td>6</td>
<td>16</td>
<td>60</td>
</tr>
</tbody>
</table>
### 16. Are you interested in further and more detailed key data?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
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<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>16</td>
<td>7</td>
<td>8</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Intended</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>11</td>
</tr>
</tbody>
</table>

### 17. Are you well informed about a heat and energy recovery within your company?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>18</td>
</tr>
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<td>No</td>
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<td>18</td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>39</td>
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<td>0</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
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</table>

### 18. Are you able to look for some specific consumption values concerning energy?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td>15</td>
<td>40</td>
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<tr>
<td>No</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Intended</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

### 19. If you deliver data, is it necessary to make it anonymous for further research?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>14</td>
<td>11</td>
<td>4</td>
<td>13</td>
<td>43</td>
</tr>
</tbody>
</table>

### 20. Do you have any support concerning energy aspects?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>13</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>Intended</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

### 21. How are your expectations concerning a European exchange of energy efficiency data?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>5</td>
<td>15</td>
<td>13</td>
<td>3</td>
<td>15</td>
<td>51</td>
</tr>
<tr>
<td>Negative</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1*</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

*Four companies from Hungary did not answered this question
22. Are you interested in more information about Energy efficiency via the EEEI project?

<table>
<thead>
<tr>
<th></th>
<th>CZ</th>
<th>DE</th>
<th>GR</th>
<th>HU</th>
<th>NL</th>
<th>Total 5 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5</td>
<td>19</td>
<td>14</td>
<td>8</td>
<td>18</td>
<td>64</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

5.2 Analysis on figures provided to the 22 questions regarding energy matters

The figures from the 67 responses to the section of energy matters generally do not show a difference in organisation structure and the availability of data among the North and the South of Europe (namely between Germany and Netherlands from the one side and Greece from the other side). There were more differences among the Germany, Greece and the Netherlands from the one side and Czech Republic and Hungary from the other side. This exists for questions regarding energy consumption and costs, for example.

Furthermore, the analysis neither included detailed comparisons among the countries for each question nor analysis between the types of the companies as it regards the use of printing technologies, except some general outcomes.

As it regards the degree of awareness of the companies for energy efficiency (questions 1 to 6), companies are divided in the middle (50%) regarding the energy efficiency possibilities. Furthermore, they seem to be slightly not aware or not to act towards certain measures, as it regards the employment of a staff member on energy matters in the company (question 2) with a percentage of negative answers of 46% (36% positive answers), the availability of energy saving information to the employees (question 3), with a percentage of negative answers of 45% (34% positive answers) and the action of spending a part of the yearly budget on energy saving (negative responses at 45%, positive and intended equally at 25%, question 6).

From the other side, they develop energy saving measures in your company at a percentage of 46% (negative responses at 35%, question 4) and, not surprisingly, energy efficiency is an issue when it comes to investments in new machinery and equipment (positive responses at a percentage of 70%, question 5).

Going further into questions regarding the awareness on ecological products for the customers and the companies themselves, (questions 7 regarding customers interested in ecological products and 8 regarding companies’ interest in ecological products) the majority of the companies stated that customers show increasing interest for ecological – environmentally friendly print-media products (at a percentage of 53%), and with a percentage of 82% the companies stated that they are interested in ecological products (responses to questions 7 and 8 respectively).

In addition, as it regards the application of environmental, management system (question 9), and the possession of an eco-management and audit scheme certification (EMAS) and an ISO-14001 certification (questions 10 and 11 respectively), a slight majority was positive regarding the
application of an environmental management system (43%), whereas there were negative responses in possessing an EMAS (84% no), and an ISO-14001 certification (negative responses at 61%).

However, it must be noted at this point that the negative responses regarding EMAS are justified in the case of companies in the Netherlands having no EMAS certification, because it is not known within the companies of the industry in this country.

Furthermore, going to the issues of availability of data regarding energy consumption in MWh (question 12), yearly energy costs (question 13) and the ways to measure production output, the majority of the companies responded positively and they provided data in this group of questions. However, in the following question 15 concerning the total energy consumption per amount of printed paper (or other production measurement unit) in Wh, the vast majority of the companies did not have this information (no 90%).

Furthermore, going in the degree of interest of the companies in further and more detailed key data (question 16), the vast majority of the companies are interested in further and more detailed key data (yes 72%). Their expectations are that they will give information about energy efficiency of comparable companies within the industry or insight in possible energy efficiency. Hence the majority of the companies is not well informed about a heat and energy recovery within the company (question 17, negative responses at 58%).

Regarding the next question (18) whether companies are able to look for some specific consumption values concerning energy, the majority of the companies responded positively (yes 60%). Furthermore, in question 19, companies do not think that it is necessary to make their delivered data anonymous for further research. This means that they are willing to deliver company data for processing regarding future studies in the issue of energy efficiency (64% negative to make data anonymous). This is the case in Germany, Greece and the Netherlands, whereas the majority of companies in Czech Republic want to keep the data anonymous and the companies in Hungary are divided by 50% to this question.

From the other side, a slight majority of the companies does not have any support concerning energy aspects (no 52%). Here there are differences among the countries – for example 67% of the companies in the Netherlands do have support concerning energy aspects, whereas this is not the case in Germany (68% of the companies do not have support concerning energy aspects).

Finally, as it regards the last two questions: 21 about the expectations of the companies concerning an European exchange of energy efficiency data and 22 whether they interested in more information about Energy efficiency via the EEEI project, the vast majority of the companies is positive and they are interested in receiving more information about energy efficiency (77% and 96% respectively).

5.3 Conclusions on awareness
From the data collected via the questionnaires and the interviews made with the graphic media companies in the 5 countries it can be concluded that there are some differences both as it regards the countries and the use of a different printing technology.

Generally speaking, it can also be concluded that energy is indeed an issue for the companies, however, when it comes to specific actions, companies are not ready to consider energy as an issue. Furthermore, energy seems to be a matter of interest in cases where energy affects the current operation of the company (such as the investment in new machinery). From the other side it is not considered a matter of when it comes to the matter of cost of each printed product-unit.

It is worthwhile to mention that there is more concern about energy consumption and management in companies with machinery on web-fed offset and flexible packaging printing (employing rotogravure and flexography printing machines) and less concern (always in comparison) in companies employing sheet-fed and digital printing machines.

A general conclusion can be that it is evident that energy is an issue for the graphic media companies, but not a major one. Actions should be undertaken towards the rise of awareness of the companies regarding energy matters and in particular concrete actions and possibly tools for use in production and management.

Although there is information available regarding energy consumption and the specification of energy costs within the operation of a company, and the management or ownership of the companies follow general recommendations and the legal framework as it regards emission of VOCs and waste disposal, however, they do not follow concrete procedures and steps towards energy saving.

As a final conclusion at this point, the survey revealed that several steps need to be done towards the rise of awareness among the owners/managers of graphic media companies in the graphic media industry in Europe. Concrete tools for production and management should be developed towards the energy saving, the reduction of energy consumption and the protection of the environment via the application of energy efficiency management.

6. Tools for efficient energy management
Based on the awareness survey, a number of tools regarding efficient energy management have been developed within the EEEI project. These tools are the following:

- Industry Awareness Tool
- SME Awareness Tool (two-page and flyer format)
- Generic Benchmark Tool
- Specific Benchmark Tool
- Measure List

The generic and specific benchmark tools and measure list were brought together in:
The European Benchmark Analyzer Graphic Media (The E-BAG)
7. Energy Benchmark Analyzer Graphic Media, the E-BAG

The benchmark tool was especially created for the Graphic Media Industry to make energy efficiency part of the policy of the companies inside our industry. To foster the awareness of SMEs a web-based energy benchmark tool has been developed - the Energy Benchmark Analyzer Graphic Media (E-BAG). Through this tool, companies can gain insight into their relative performance in the field of energy consumption, allowing them to compare themselves to colleagues in the industry. The tool was built to require only that core company data which is needed to provide the required output. After entering the relevant company and energy use data, the company can see their relative position as scored on several key indicators, and can generate a report containing these results. Companies that are stimulated to investigate possible energy efficiency in more detail have the possibility to follow up on this generic analysis with a more thorough specific analysis, performed by an energy consultant. This specific analysis is the logical next step for all SMEs that intend to apply an energy reduction plan and a respective management application and action.

To gain specific sector information, over one hundred companies were interviewed about their energy consumption. The results of the resulting European Synthesis Report can be found on the website (www.eeei.info).

Another product of this European Project was a measure list that contains a number of relevant measures for the Graphic Media Industry, each of which can be implemented in the individual SMEs. This list includes very detailed information to help SMEs rid themselves of the barriers that still impede them on the path to a successful energy policy.

The following picture shows the order in which all the entered data in the benchmark tool is useful for the company.
The E-BAG Improvement Circle

Below you see your E-BAG Improvement Circle, which will be your navigator throughout this energy benchmark tool. As a start, you must go through Step 1 where you will provide the necessary figures about your company’s energy consumption. This program will help you through each following step, to achieve your final result: a clear picture of your energy consumption compared to your colleagues in your business and a list of practical energy improvement measures. Simply to save money and make a contribution to our planet.

Picture 4: E-BAG Improvement Circle
7.1 Company data

Company profile

Below are the company details as entered in the EEEI tool. In later sections of this report you will find your relevant company information compared to the industry standard. You can use the resulting benchmark data as you see fit, but no rights are derived from it. If you wish a more detailed analysis, you may use the ‘specific’ analysis tool. You can see your own entered data (in blue), as well as the accompanying standardized values (in black) below.

Picture 5: Basic Company Information
Some additional information:

This analysis uses seven company types, as derived from the European Synthesis Report. These are: sheet-fed offset printing, web offset printing, flexography printing, book binding, gravure, screen printing and digital printing. There is the possibility that a company does not fit one of these types perfectly. In that case the most appropriate matching type must be chosen.

The full time equivalent is based on a 40-hour work week. If one of the employees works 24 hours, this employee should be counted as 0.6 employee.

In the generic benchmark a company must assign a production factor. This production factor is necessary to make the comparison between the amount of energy used and the actual production volume. A user must choose between two types: kilograms of substrate produced per year (kg / year), or the total amount of square meters of substrate produced per year (m² / year). This latter factor is intended for those company types which have a great variety in sizes of substrate. A good example is the screen printing industry. The standardized production factor is set as kg / year.
Company Energy profile

To be able to perform a good Benchmark it is important that each participant enters the required information in a usable and comparable manner. To regulate this data, strictly defined energy sources are used in the generic benchmark. The entered company data is combined with pre-defined parameters (derived from the European report) to arrive at a comparable standard. Again, you can see your own entered data (in blue), as well as the accompanying standardized values below.

**Picture 7: Company profile**

In the first table below you can see the actual yearly resource use of energy sources. When giving the fuel use information, the company could define (up to) two fuel inputs, of the following types: natural gas, black coal, brown coal, dry wood, (home) fuel oil, heavy heating oil.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Use</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>12,222</td>
<td>kWh</td>
</tr>
<tr>
<td>Fuel</td>
<td>22</td>
<td>natural gas (m3)</td>
</tr>
<tr>
<td>Optional additional fuel</td>
<td>3,222</td>
<td>natural gas (m3)</td>
</tr>
<tr>
<td>Water</td>
<td>212</td>
<td>m3</td>
</tr>
</tbody>
</table>
The second table contains the (calculated) standardized yearly resource use of your company. To make this calculation, your company working hours were used and all the energy uses were transformed to megajoules (MJ), the international standard.

### Yearly Resource use

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Use (MJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>43,999</td>
</tr>
<tr>
<td>Fuel</td>
<td>696</td>
</tr>
<tr>
<td>Optional additional fuel</td>
<td>101,976</td>
</tr>
<tr>
<td>Total fuel</td>
<td>102,673</td>
</tr>
<tr>
<td>Water</td>
<td>3,180</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>149,852</strong></td>
</tr>
</tbody>
</table>

In the following table, the company's total resource cost for each energy source is shown in Euro’s. Countries that do not have the euro as (national) standard currency must calculate the amount in Euro’s using their own exchange rate.

### Total Energy and Water Cost

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Cost (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>123</td>
</tr>
<tr>
<td>Fuel</td>
<td>123</td>
</tr>
<tr>
<td>Water</td>
<td>123</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>369</strong></td>
</tr>
</tbody>
</table>

In the last table below, the company's cost for each energy source is shown in Euro's per MJ. The E-BAG is automatically calculating this value for the company.

### Total Energy and Water Cost per MJ

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Cost (EUR / MJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>0</td>
</tr>
<tr>
<td>Fuel</td>
<td>0</td>
</tr>
<tr>
<td>Water</td>
<td>0</td>
</tr>
</tbody>
</table>
8. Generic Energy Benchmark

Entrepreneurs like being able to compare themselves with their colleagues in the industry. As such it is possible to compare one company with companies of the same type in the E-BAG. Using the data provided for a certain company and energy profile, the E-BAG has calculated the score and the benchmark accompanying it. This has been done for six core indicators that are relevant for this project (see the table below). The results of this benchmark are not sufficiently validated yet, due to the fact that at this level of analysis the fostering of awareness is the primary goal and that the data was not entered by an expert. To keep the reliability of this data high, it is monitored by the administrator.

The goal of the generic benchmark is to motivate entrepreneurs to pay more attention to energy management. Especially those companies scoring relatively poorly are advised to contact their country administrator to – freely – work together with a consultant on the logical next step following this generic benchmark.

To keep the data transparent and give a clear signal on the company’s specific score per indicator as compared to the average, this achievement is shown in three colors. These are red (a score below the norm and a high potential for improvement), orange (an average score, with some room for improvement) and green (above average performance).
9. Specific Energy Benchmark

The goal of the specific benchmark is to enhance the capabilities of the entrepreneurs to improve energy efficiency even further than the generic benchmark can. This specific benchmark offers a powerful overview of the state of energy efficiency for the company. Entrepreneurs like being able to compare themselves with their colleagues in the sector. As such it is possible to compare the company’s data with companies of the same type in the E-BAG benchmark. Using the data provided in his specific energy analysis, the E-BAG is calculating the score of the company and the benchmark accompanying it.

In the picture below the company’s value and score, as well as the average and best value of all companies within the E-BAG for these benchmark indicators are presented.

*Picture 9: Specific Energy Benchmark*
To keep the data transparent and give a clear signal on the company’s specific score per indicator as compared to the average, this achievement is shown in three colors. These are red (a score below the norm and a high potential for improvement), orange (an average score, with some room for improvement) and green (above average performance).

The list of benchmark indicators below explains the way the specific indicators are calculated:

Ventilation
Yearly electricity use for ventilation (MJ / a / m3)

Heating
Fuel use for heating per building volume and per Heating Degree Day (MJ / m3 / HDD)

Cooling
Electricity use for cooling per building volume and per Cooling Degree Day (MJ / m3 / CDD)

Humidity
Electricity use for humidifying per building volume and per Relative Humidifying Day (MJ / m3 / RHD)

Lighting
Yearly electricity use for lighting per floor area (MJ / m2 / a)

Office equipment
Yearly electricity use for office equipment per floor area (MJ / m2 / a)

Production
Electricity use for production machinery per kg produced paper (MJ / kg)

Internal transport
Electricity use for internal transport per kg produced paper (MJ / kg)

Drying in production
Electricity use for drying processes in production per kg produced paper (MJ / kg)

External compressed air
Electricity use by an external compressor for production of compressed air per kg produced paper (MJ / kg)

Shredder
Electricity use by the shredder per kg produced paper (MJ / kg)
10. Energy Efficiency Improvement Measures

The specific analysis, leads to certain decisions on energy matters performed in the company, and it can result in an overview of relevant energy efficiency measures for this company, the energy reduction percentage and the payback time for these measures. This overview is presented below:

P.1 Energy efficient press drive

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

P.2 Gas-heated (IR) drying

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

P.3 Reusing residual warmth of dryer and/or linked-up equipment

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

P.4 Optimize air household of dryers

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

A.1 Building orientation

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

A.2 Insulation

Energy Reduction % (reference) 1
Payback time (reference) <1 annum (<1 annum)

A.3 Limiting sun radiation

Energy Reduction % (reference) 2
Payback time (reference) <1 annum (<1 annum)

A.4 Optimizing ventilation
<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.5 Frequency regulation ventilators

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.6 Preventing loss of ventilation

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.7 Heat recovery from ventilation air

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>1-3 annum</td>
</tr>
</tbody>
</table>

A.8 Good Housekeeping heating

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.9 Regulating temperature per room

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.10 Support ventilators

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.11 Application of high efficiency air heaters

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.12 Application of radiation heating

<table>
<thead>
<tr>
<th>Energy Reduction % (reference)</th>
<th>Payback time (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>&lt;1 annum</td>
</tr>
</tbody>
</table>

A.15 High efficiency boiler or combination HE/VE boiler
A.16  Weather dependent regulation

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.17  Optimizing unit

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.18  Cascade/ boiler order connection

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.19  Insulation pipes, valves and appendages

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.20  Vaporization cooling

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.21  Good Housekeeping space cooling

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.22  Point exhaustion

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

A.23  Application low-energy humidifying system

Energy Reduction % (reference)  

A.24 Good Housekeeping humidifying

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

A.25 Drawing up a lighting plan

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

A.26 Low-energy lighting

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

F.1 Reuse of residual heat of vacuum pumps and compressors

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

F.2 Central system with cascade switching vacuum pumps and compressors

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

F.3 Low-energy compressors

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

F.4 Suck in open air

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )

F.5 Good Housekeeping compressed air

Energy Reduction % (reference)  (1)
Payback time (reference) <1 annum ( <1 annum )
F.6 Installing valve per user/user group

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.7 Separated high and low pressure net

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.8 Optimizing pipe diameters and size buffer vessel

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.9 Float-steered water separator (instead of time-steered)

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.10 Good Housekeeping vacuum

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.11 Insulation cold pipes

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.12 Use of free cooling

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.13 Low-energy refrigerators

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)

F.14 Weather dependent regulation of cooled water

Energy Reduction % (reference) (1)
Payback time (reference) <1 annum (<1 annum)
F.15  Good Housekeeping cooled water

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

F.16  Use of condenser heat

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

F.17  Optimizing dust/shred exhaustion

Energy Reduction % (reference)  
Payback time (reference)  <1 annum

EA.1  Building Management System

Energy Reduction % (reference)  
Payback time (reference)  <1 annum
Based on the energy use analysis, the energy consultant has the opportunity to add up to two extra customized energy efficiency measures specifically intended for a specific company. This information is presented in the boxes below.

*Picture 10: Customised energy measures*
Potential Savings

The natural consequence of completing the energy efficiency measures should be savings - both in money and in environmental impact (CO2 reduction). Based on the relevant saving percentages and payback times, the E-BAG is generating an overview for the company.

While energy efficiency is primarily a worthwhile concept due to the environmental effects, there are additionally significant potential savings on energy costs, directly occurring after certain energy saving measures taken by the company, thus making the E-BAG benchmark financially quite attractive. To provide the company ownership or management with the necessary information about the financial consequences of the energy efficiency increase, additional information graphically presented in the specific report of the company illustrate a global overview of the cumulative possible yearly savings when the full measure list is implemented.

Conclusions on the EEEI energy efficiency benchmark and the E-BAG tools:

The Specific Benchmark Report is presenting the energy situation, energy and water use and energy distribution of a specific company participating in the benchmark. It reveals the company's energy consumption in comparison with other companies within the European industry. The possible measures and possible yearly savings and financial benefits presented can lead to management actions of the company interested in additional investigations into the possibilities for financial and environmental benefits. The additional investigation will most likely be necessary to generate a sound investment plan, based upon fulfilment of advised energy efficiency measures, in order to provide the company with yearly savings.

11. Results of the EEEI project
Based on the activities of the project partners, the results from the whole action are illustrated:

**Number of SMEs directly participating in the benchmarking.**

*Quantification of success: at least 80 SMEs in DE, HU, CZ and GR participating in the EEEI project.* At the end of the action the total number of SMEs directly participating in the benchmarking of the EEEI project in Germany, Hungary, Czech Republic and Greece is: 83 SMEs. This result is 3.75% more than the 80 SMEs. All together (including The Netherlands) 105 SMEs are directly participating in the benchmarking. This result is 5% more than the 100 SMEs we planned at the beginning of the action. The benchmarking and consultancy took place during Work Package 4 (benchmarking and consultancy of SMEs).

*Quantification of success: at least 75% of them convinced about the usefulness of the developed tool for their company.* During the action we have had good contacts with SMEs concerning the benchmarking and consultancy. We have gathered letters of reference from 55 SMEs, which is 70% of the 80 SMEs in DE, HU, CZ and GR, participating in the benchmarking.

![Number of companies in benchmark](image)

*Picture 11: Number of companies in benchmark*

*Achieved attention in the participating countries in national workshops.*
Quantification of success: At least 20 representatives from graphic media industry. During the action our partners have organized 5 national workshops in the five partner countries, together with the national associations. During these national workshops a total of 103 representatives from the graphic media industry attended the national workshops. In some countries the workshops were visited by more and in some countries by less than 20 representatives from the graphic media industry, but in total the planned attention was achieved.

Number of SMEs from participating countries approaching to receive information/join the benchmarking.
Quantification of success: At least 5 more SMEs per country interested to use the tools. At least 5 more SMEs per country are interested to use the tools, according to the letters of interest we have gathered from the SMEs. In total we received 26 letters of interest from the participating countries.

Number of industry associations from participating countries to take over the tools for continuation.
Quantification of success: In at least 3 of the 5 countries the industry association is ready to take over the tools for continuation. The industry associations in all the five participating countries were informed about the project and actively involved in project activities. They are informed about and actively involved in the tools and have got the results of the benchmarking. In The Netherlands and Greece the industry associations sent a letter of continuation. From the other countries we received letters of continuation from Chambers of Commerce and Chambers of Crafts (Germany), National Association of Chambers of Commerce (Hungary) and the Ministry of Industry and Trade (Czech Republic). This result means that in all countries continuation by either the national industry association, chambers of commerce or crafts or Ministry of Industry and Trade is guaranteed.

Increased interest in energy efficiency and the EEEI Project outside the participating countries.

Number of direct participants in European Conference.
Quantification of success: at least 60 participants from the industry at the European Conference coming from at least 12 different Member States. The European Conference was organized on March 27 2009 in Wuppertal, Germany. In total 60 participants from the industry, coming from 8 different Member States, attended the European Conference.

Number of requests from further countries to join the benchmarking activity.
Quantification of success: 5 more countries interested to undertake similar initiative.
We have had requests from the following countries: Austria, Denmark, Finland, France, Spain, Slovakia, United Kingdom. So there is interest in 7 more countries and also support from the international industry confederation INTERGRAF, located in Belgium. The project results and benchmark will also be presented to the INTERGRAF European Director’s Meeting, so all 27 national member associations will be informed and can join the benchmarking activity.

Energy reduction (direct).
Quantification of success: 35.000 GJ of yearly potential energy savings from EEEI project. By the E-BAG benchmark tool database, we have measured a total of 55.000 GJ of yearly potential energy savings from the EEEI project. This result is 60 % more than the quantification of success of 35.000 GJ.
Energy reduction results (GJ)

Picture 13: Energy reduction results
Reduction of CO2 emission (direct).
Quantification of success: 2.455 Ton of potential emission reduction each year from EEEI project.
By the E-BAG benchmark tool database, we have measured a total of 4596 Ton of potential emission reduction of CO2 each year from the EEEI project. This result is 80% more than the quantification of success of 2455 Ton.

**Picture 14: Reduction of CO2 emission results**
Decreasing energy costs (direct).
Quantification of success: 490,000 EUR of potential decreasing yearly energy costs of participating SMEs in EEEI project. By the E-BAG benchmark tool database, we have measured a total of 1,000,000 EUR of potential decreasing yearly energy costs of participating SMEs in the EEEI project. This result is more than 100% more than the quantification of success of 490,000 EUR.

Picture 14: Decreasing energy costs results

Final Results of Benchmark, after finishing the action
After finishing the action, a final measurement on May 22 2009 reported as final results of benchmark:
- a total of 105,815 GJ per year of energy reduction
- a total of 6,866 Ton per year of reduction of CO2 emission.
- a total of 1,670,851 EUR per year of decreasing energy costs.
12. Lessons learnt

During the project, the energy issue has been widely discussed among the project partners and their organisations, the consultants, the key actors, representatives of associations and European organisations. Certainly, the discussion was much more intensive and fruitful with the companies - their owners, managers and staff, as well as the entrepreneurs of the Graphic media industry in Europe.

A first outcome from the project run was this involvement of the industry in discussions regarding energy awareness, the analysis of energy situation of the companies after the data collection, indicators for potential reduction of energy use costs and the measures described for concrete actions.

Therefore, the project has led to a quite satisfactory degree of transparency on energy matters and, as such it has created significant added value as it concerns sustainability.

A first lesson that has been learnt out of the project run was that quite often, energy matters are hidden and are not taken under serious consideration by the entrepreneurs/owners or managers of the graphic media.

A second outcome was that SMEs still have obstacles to save energy, obstacles which are in general solved in the larger companies of the industry. These obstacles can be divided in technological and non technological obstacles. Especially the non technological obstacles have to be broken down in order to make an energy efficiency improvement policy possible.

The survey on awareness and the benchmark conducted, revealed that energy is NOT an issue for the majority of the companies, although they are willing to be active on energy efficiency, when they learn something about this matter. Awareness is the next issue regarding energy matters at company level within the graphic media industry. have to become aware of the energy- and environmental costs of their companies and get mobilised to improve their efficiency, cost effectiveness and policy.

Since optimized energy efficiency and environmental protection are becoming increasingly important, the graphic media companies need to get more knowledge about sustainability, energy – and environmental matters, and how other SMEs within their industry deal with improving energy efficiency.

The procedure followed by the EEI partners in the five project partner countries, revealed also that when energy matters become transparent, after the benchmark by a consultant has been taking place, the companies are willing to act, because energy becomes an issue for them. This takes place in particular after certain focused and concrete measures are proposed, including the economic dimension of a measure as proposed by the E-BAG tool, together with the managerial and technological innovation that needs to be applied.
Furthermore, the project work has led to the lesson that need to be advised and consulted by experts and should be supported by innovative tools like the E-BAG tool. The reduction of energy consumption is a management issue and it should not be treated as a matter of reducing greenhouse emissions only. Energy efficiency is finally a matter of management, which needs to be addressed seriously and applied at the daily operations of the company as well as in the strategic orientation and further development of each company.

The efficient energy management should synthesize knowledge and develop tools for assessing and developing sustainable energy policies in SMEs within the graphic media industry. Within the management approach, a strategic vision on sustainability, energy and environmental matters in the company should be developed and implemented in order to become more efficient and save money. As a result, energy matters need to be integrated within other company priorities like quality of products and services, costs effectiveness and environmental policy.

A conclusion on lessons learnt

The traditional graphic media SMEs are only able to participate in new media markets to a limited degree. In order to expand their business they need to be continuously innovative to apply new management, production and service concepts and to operate as the "providers of media and communication solutions". This type of procedure can be only implemented by full service SMEs. Energy is indeed one of the issues of high importance nowadays and will be more important in the future. As such, it should be implemented in the daily operation practice of the companies.
13. Recommendations for the attention of key decision makers

As key decision makers in the graphic arts and media industry in Europe we can name the European confederations and organizations such as Intergraf and UNI-Europa Graphical, networks such as EGIN, research and scientific international associations such as IARIGAI and the International Circle of Graphic Media Universities. Furthermore, the national associations and federations of the printing industry are key players for the industry in each country. Additional key players are the manufacturers of printing and finishing machines and systems, and the manufacturers / providers of technologies for energy reduction and environmentally friendly machines, systems and materials.

These organizations can act towards new policies and strategic orientations for the development of the industry, the companies and the people working in the industry. These organizations can develop and suggest recommendations regarding sustainability, energy and environmental protection, which are breaking down as concrete actions and measurements, apart from the various standards and the legislation on certain matters.

The first recommendation should be to propose a holistic way for the sustainable development of the industry. This sustainable development - among others regarding energy - should include the visualization of the often hidden use of energy and the provision of the technical know-how to reduce energy consumption, with the necessary management structures.

The management approach to be implemented includes the collection of accurate operational ecological and energy key data. These data can then be processed and compared with different companies through the benchmarking approach. Secondly, indicators created can lead to optimized procedural methods for the intelligent use of energy, including adapted management tools.

It is important to develop no or low-cost energy efficiency measures, because these could be initial impulses for further activities. As a result from such a management procedure, transparent key data, indicators and a list of measures are needed to achieve the precondition for establishing changes, required in SMEs to apply an energy efficient management. The E-BAG tool developed within the EEEI project is exactly the innovative and functional application for efficient energy management.
Additional recommendations regarding energy issues as they have extracted during the EEEI project run are the following:

Graphic media companies are generally NOT aware on yearly energy consumption and costs. They lack of awareness on the issue of energy consumption. Energy costs are included in general expenses and are not associated with production output. Therefore, companies need to be properly informed about new management procedures, techniques and technologies for the reduction of energy resources consumption and there is a need for enhancing awareness on energy and environmental issues.

Within the European Graphic Media Industry both at Europe and national level it is recommended to:

- Establish in-depth knowledge about energy efficiency
- Eliminate still existing barriers concerning efficiency improvement
- Tailor tools exactly fitted to the graphic media industry
- Involve and proper train people (managers, workers) handling energy matters and making energy saving information transparent and available to the staff
- Transform loose (non systematic) energy saving measures applied by the companies to concrete management procedures
- Relate various certifications such as EMAS certification and ISO-14001 with energy management and connect them within the sustainable development of the companies
- Consult companies in providing specific energy consumption values. This has been proved to be a difficult task for the owners, managers of the companies
- Introduce energy as an important factor on investment decisions.

Some (not all) specific matters concerning energy consumption in graphic media companies that need to be addressed are:

- Production cooling / heating
- Energy consumption for compressors
- Energy reduction for “stand-by” production operations.
- Energy consumption for VOC cleaning
- Use of renewable power resources (solar and photovoltaic systems, windmills etc.) at company level
- Use of drying systems on printing and varnishing (UV, Infra-red, Hot air)
Conclusions on recommendations:

- Energy savings have a good potential in the graphic media SMEs
- *Energy should certainly be a matter of daily practice in the companies*
- *Energy should be a matter of management within the company operation.*
- The application of a system for environmental management appears to be a necessity, however, it needs to be implemented with energy management

The tools developed within the European Energy Efficiency Improvement – EEEI project and in particular the E-BAG tool, provide innovative solutions for the majority of energy matters in the graphic media industry and are a first step to support the graphic media key-decision makers and the players within the industry for strategic orientations regarding management and production and the efficient application of energy management at the companies.
14. Future actions

A first step for future work can be the development of proper advice and procedures on energy efficiency management. Based on the material developed within the EEEI project, a publication entitled “Energy Management Guidelines”, oriented specifically for the European graphic media/printing industry can be developed, for use by the companies, the associations and federations.

Furthermore, actions on sustainability within the Graphic Media Industry need to be spread all over the industry. In particular, energy efficient management need to be further addressed in the industry, becoming a daily concern and issue for action at company level. Key actors (federations, organizations and experts or consultants) should work further to promote and disseminate energy efficiency and rational use of resources. This can be done more efficiently by expanding and improving the European energy benchmark tools and by improving industrial excellence in energy in the European Graphic Media Industry.

A step towards this objective is to achieve a “critical mass” or “multiplier effect” at industry level, focusing on expanding the set of (benchmark) tools to SMEs and key actors in the European member states. This action appears as a necessity, so progress built on the European Energy Efficiency Improvement action (2007-2009) described in the present study, can be expanded to reach a wider audience within the graphic media industry in more EU countries and later to other industries.

One of the important specific future actions can be the creation of a Graphic Media Elevator Effect, whereby every participating country has the possibility to create a tailor made national awareness program. A national program – promoted by the national representative of the Graphic Media Industry - which will be better understood and accepted by the most important target group of this action: the SMEs. By involving the various networks of the industry (INTERGRAF, IARIGAI, EGIN) and the experience of the participating project partners, such a goal can be achieved.
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