International Chamber of Commerce
*The world business organization*

PEACE AND PROSPERITY THROUGH WORLD TRADE
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**Discussion Paper**

Prepared by ICC Commissions on

**Environment and Energy**

# Energy efficiency with case studies

## Contents



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# Key messages

- Energy efficiency is a fundamental element in the progression towards a future low-carbon economy. Actions to increase energy efficiency can make a significant impact in squaring the circle between an increased demand for energy and environmental protection, ensuring a move towards a more sustainable energy future.
- Improvements in energy efficiency have played a key role in limiting global increases in energy consumption of resources and greenhouse gas emissions over the past three decades, while maintaining the quality of the energy service. However, considering future trends in world energy use, increasing concerns about access to energy and energy security, significant challenges need to be addressed, for which energy efficiency will be part of the solution.
- There is a strong business case for energy efficiency, it enables companies to save costs, improve their competitiveness and overall productivity. Moreover there are also opportunities to develop new businesses that enhance efficiency across countries and sectors. However, several barriers remain to energy efficiency improvements.
- In order to overcome these barriers, governments need to create a policy environment that rewards energy-efficient choices and encourages innovation. Economic and financial incentives and government support for professional training and consulting, research, development and deployment are a first step.
- Reinforcing the market for energy efficiency through innovative mechanisms, such as standards, labels, public-private partnerships and energy performance contracting, may lead to increased certainty and demand for energy efficiency which will foster private sector initiatives.
- The buildings and residential/commercial energy-using equipment sectors in particular has a high potential for large cost-effective energy savings.
- International cooperation on energy efficiency policies helps trigger synergies fostering technology improvements, through the removal of barriers to the deployment of better technologies in the market place. Coordinated policies and standards, the sharing of information on energy efficiency tools and best practices, are critical for enhancing global trade and diffusing energy efficiency improvements.
- Businesses should develop new management approaches at senior management levels in order to fully exploit opportunities for increased energy efficiency, especially by increasing awareness of their energy consumption and savings in the long term, as well as planning and implementing actions such as demand side management.

# Introduction

At the 2008 summit in Hokkaido Toyako, Japan, and again in 2009 in L'Aquila, Italy, G-8 leaders called for a 50 percent reduction in greenhouse gas (GHG) emissions below 2050 to avoid the most serious consequences of climate change. Meeting this goal requires transforming the way energy is produced, delivered, and consumed across all sectors of the economy and regions of the world.

According to the International Energy Agency,(IEA) investments of $26 trillion will be required on the supply-side for projects related to energy access, to diversify energy supplies, modernize infrastructure, and promote greater efficiency, between now and 2030. If we are to see this "energy revolution" it is vital to address the question of secure and pertinent investment in energy supply as well as on the demand side in developing, emerging and developed economies. This will be instrumental in a move towards a future low-carbon economy.

This is especially important in light of the global economic crisis which has underscored the urgency of sustainable development, emphasizing a mutually reinforcing balance of economic, social and environmental progress. Moreover, the crisis highlights the need to work efficiently and cooperatively to develop the policy and financial drivers needed to delink environmental impacts from economic growth and provide energy access.

There is an urgency to act, and while the crisis creates new challenges, it also underscores the importance of seeking cost-effective opportunities for action. Indeed, the more rapid and successful attainment of environmental objectives should be a priority in government stimulus plans and should favour environmental stewardship and energy efficiency.

Energy efficiency is a fundamental element in the progression towards a more sustainable energy future and has been on the business agenda for years with significant strides already achieved. As global energy demand continues to grow, actions to increase energy efficiency will be essential. There are many environmental benefits to energy efficiency including reduced emissions and reduced use of resources. In this paper the International Chamber of Commerce (ICC) builds on past work on energy efficiency[1] to deliver international business' extensive experience and innovation in this area.

## Access to energy

As access to modern energy services increases, quality of life improves. Moreover, a robust and flexible energy infrastructure is of critical importance to the provision of many other services as well as industry and manufacturing. Energy contributes to meeting basic needs, such as clean water, food preservation, transportation, healthcare, sanitation, education and communications.

Maintaining and growing the energy supplies required to provide access to those lacking it and to meet future demand with reduced environmental impacts will require significant long-term investment in every element of the supply and use chain. More sustainable energy pathways play a key role in ensuring that economic activity advances social development and environmental protection in both developed and developing countries. Energy efficiency has a crucial role to play in this regard and businesses all over the world have been leading the way.

## Energy efficiency and climate change

Any successful action on climate change must stabilize atmospheric greenhouse gases while at the same time maintaining economic growth. There is a clear need for the services that energy provides (e.g. clean water, heat, light and mobility) to fuel economic growth.

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[1] *Please see ICC Policy Statement "Energy efficiency, a World Business Perspective" May 2007 at www..iccwbo.org*

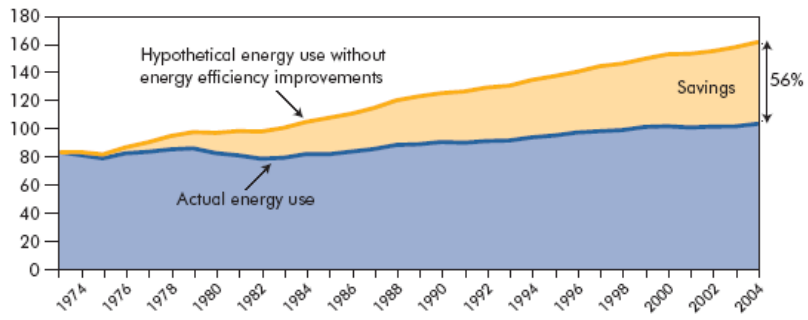
Energy efficiency can be implemented in the short term and many existing technologies are available today. Widespread commercialisation of energy efficient technologies and service, on the supply and demand side, is one of the most effective strategies to address climate change and energy access and security concerns especially in developing countries.

Energy efficiency is not a panacea, but combined with an increased diversification of energy sources and technological advancements, it can make a significant impact in squaring the circle between an increased demand for the services energy provides and environmental protection.

## The current status of energy efficiency

Energy efficiency refers to the ratio between the input of energy consumed and the output of an energy service. The IEA reports that "improvements in energy efficiency over the past three decades have played a key role in limiting global increases in energy use and carbon emissions". "Worldwide energy consumption would be 56 percent higher today than it would have otherwise been without the various energy efficiency policies that have been implemented since 1973"[2].

**Long-term energy saving from improvement in energy efficiency, OECD-11, 1973-2004**
Without 30 years of energy saving from improved energy efficiency, energy consumption in OECD countries would be more 56percent higher today.




Source: OECD/IEA, 2008

## Future challenges and energy efficiency opportunities

Despite continuing improvements in energy efficiency, world primary energy use is projected to grow by 1.6 percent per year on average between 2006 and 2030 – an increase of 45 percent – in an IEA Reference Scenario that assumes no change in current governmental policies. More than 70 percent of the projected increase in overall energy demand comes from developing countries, where economic activity and populations are growing fastest.

However, there is considerable remaining potential for improving efficiency in these economies. This is demonstrated by the IEA's climate policy scenarios corresponding to long-term stabilisation of greenhouse gas concentration at 550 and 450 parts per million (ppm) of CO2 equivalent. The 550 ppm scenario equates to an increase in global temperature of approximately 3°C, the 450 ppm scenario to a rise of around 2°C. In the 550 ppm scenario alone, by 2030 both total greenhouse gas and energy-related CO2 emission are 19percent lower than in the Reference Scenario, mainly as a result of energy efficiency gains3.

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[2] *Worldwide trends in energy use and efficiency, IEA 2008, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=2026*

[3] *World Energy Outlook, IEA 2008 http://www.worldenergyoutlook.org/docs/weo2008/WEO2008_es_english.pdf*

# I. What is the business case for energy efficiency?

## Business case for energy efficiency

As suppliers and consumers of energy all over the world, ICC members strongly support and pursue economic approaches to energy efficiency. Energy efficiency makes sense to business in a wide range of sectors for compelling reasons as it:

- reduces costs by saving on the utilisation of resources;
- reduces dependency and increases security of supply;
- creates increased export opportunities for new, energy-efficient technologies via first-mover advantages;
- reduces greenhouse gas emissions and other environmental impacts;
- extends the availability of large but non-renewable sources of energy;
- makes energy more affordable to consumers by reducing use and the overall need for investments in energy supplies;
- creates jobs in supplying energy-efficient technologies and practices;
- improves competitiveness and overall productivity.

Energy efficiency measures provide a win-win situation by promoting cost-savings, lowering environmental impacts while at the same time promoting economic growth and social development. In addition to generating very large annual energy savings, present outlays on energy efficiency would avoid investment in energy infrastructure that would otherwise be needed to keep pace with accelerating demand. The IEA estimates that, on average, an additional $1 spent on more efficient electrical equipment, appliances and buildings avoids more than $2 in investment in electricity supply – particularly valuable in economies where lack of capital is a constraint to growth[4]. Indeed it is much more economic to incorporate improved energy efficiency features when installing new capital than to retrofit at a later stage. All these advantages and the general track record of energy efficiency policies have made it a political priority in many countries.

## Potential reductions in energy consumption exist across sectors

Many opportunities to improve energy efficiency exist across sectors:

### Building (residential, commercial and public)

The building sector, which accounts for nearly 40percent of global energy use[5], is the largest area of potential and has very high-return opportunities in high-efficiency building shells and more efficient air conditioning, water heating, appliances and equipment, as well as for advanced lighting options such as compact fluorescent lamps (CFL), light-emitting diodes (LED) and improved controls. Increased insulation in both the new-build and retrofit markets is a particularly large opportunity for savings.

### Industrial

This sector has a broad array of fragmented opportunities in steel, chemicals, aluminium, food processing, textiles, electronics, and many other industries. There are also large cross-sector prospects such as combined heat and power (CHP) generation, heat pumps and the optimisation of motor-driven systems.

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4 *World Energy Outlook 2006, IEA, 2006*

5 *IEA 2008b*

### Transformation

Energy is lost when the power generation and refining sectors transform energy from one form to another. The conversion efficiency of these operations can be improved through optimal operation and maintenance of power plants as well as the retrofitting of existing plants.

### Transport

While automotive manufacturers are likely to adopt engine-related fuel-economy improvements and electric vehicles, opportunities exist in reducing vehicle weight and size through material substitution and vehicle redesign.

## Challenges to energy efficiency improvements

Although there are ways to reduce energy expenses and carbon emissions at no economic cost or with high-return opportunities, they remain generally unexplored. What accounts for the disconnect between what the cost curves suggest makes economic sense and the actual behaviour of firms and individuals? A range of barriers exist to the greater deployment and adoption of enhanced energy efficiency measures. For example, information barriers, market imperfections and policy distortions impede consumers and businesses from taking opportunities to invest in energy efficiency.

### Information barriers

Consumers often lack the information they need to become more energy productive, and tend to make choices based on non-financial factors. It is particularly difficult to learn about the performance and costs of energy-efficient technologies and practices, because their benefits are not directly observable. For example, households typically receive an energy bill that provides no breakdown of individual end-uses and no information on GHG emissions, while infrequent meter readings (e.g., once a year, as is typical in many EU countries) provide insufficient feedback to consumers on their energy use and on the potential impact of their efficiency investments. Among businesses, the small and fragmented nature of energy costs in most operations tends to deter businesses from capturing the full potential available. Furthermore, energy efficiency investments are often overlooked because new and unfamiliar technologies are wrongly perceived to be unreliable.

### Management obstacles

Energy efficiency investments often tend to be classified as discretionary maintenance projects. They are usually given a lower priority to essential maintenance projects or strategic investments. Generally, top management has historically not considered energy-cost savings as a strategic priority in comparison to large, strategic projects.

### Misplaced incentives

In many instances individuals who will not benefit from the energy savings frequently make investment decisions – this is known as the “principal-agent problem”. For example, landlords are not inclined to invest in energy efficiency if the investment costs cannot be passed on to their tenants, who will benefit from the investment through lower energy costs. Decisions about the energy features of a building (e.g., whether to install high-efficiency windows or lighting) are often made by agents not responsible for the energy bills or not using the equipment. In many countries the energy bills of hospitals are paid from central public funds while investment expenditures must come either from the institution itself or from the local government. These split incentives are also complicated by billing practices that can mean tenants do not pay specifically for the energy used. Many apartments and offices in multi-occupied blocks do not have individual heating systems or meters to measure consumption. The same problem exists in the manufacturing sector, i.e. as long as energy efficiency and the running costs of appliances are not well understood by users, there is no formulated demand for more efficient appliances. Manufacturers have a limited interest in improving the efficiency of their products since they do not bear the cost of the induced electricity consumption.

### Financial obstacles

Investments in energy efficiency are often impeded due to the initial cost barrier and difficulties in raising capital, combined with relatively long payback periods. The inadequacy of traditional financial mechanisms for energy efficiency projects are also a challenge. Indeed, within a company, access to capital issues often stem from a neglect of energy efficiency within internal capital budgeting procedures, combined with other organisational rules such as strict requirements on payback periods (usually short periods with a required rate on return). Even if they have great access to capital, businesses may still be unwilling to accept payback periods stretched out over the life of the investment, given uncertainty about future energy prices and actual energy cost savings.

### Competition barriers

Excessive and non-transparent state intervention in energy markets often directly discourages efficient energy use, for example through energy subsidies offered to state-owned enterprises. Indeed, in many countries electricity historically has been subsidized to residential customers, creating a disincentive for energy efficiency. This is particularly the case in many developing countries and historically in Eastern Europe and the former Soviet Union – for example widespread fuel poverty in Russia has driven the government to subsidize energy costs. Energy pricing that does not reflect the long-term marginal costs of energy hinders the penetration of efficient technologies.

### Trade barriers

Many trade-restrictive measures, including tariffs and border charges as well as non-tariff measures such as cumbersome trade-documentation systems, product standards, restrictions on after-sale services, complex certification requirements and restrictions on foreign investment deter businesses from exporting energy efficient products and technologies.

### Weak intellectual property rights

At the same time, in some countries an ineffective enforcement of intellectual property rights discourages research and investment in energy efficiency. Without the necessary protection provided by patents, private sector investment, development and deployment of energy efficient technologies are impeded. This is especially true for developing countries where the need for foreign direct investment and technology development and deployment is crucial.

# II. Recommendations

To overcome these barriers, governments need to create an environment that rewards energy-efficient choices and encourages innovation, and businesses should develop management approaches.

## 1. Developing government incentives and support

### Appropriate energy pricing

Adequate pricing is a necessary condition for promoting energy efficiency. The first step of any energy efficiency policy should be to adjust energy prices in order to give correct signals to consumers, thereby providing incentives for behaviour changes or to acquire energy efficient equipment and technologies. For instance, Japan has increased the cost of energy at higher consumption levels (e.g. increasing electricity rates for residential customers), as a way to encourage lower energy consumption.

### Enhanced incentives

Economic incentives have proven very helpful in making investments in energy efficiency more attractive. A course of action consists in reforming utility-company incentives to reward energy efficiency rather than solely volume supplied, i.e. in “decoupling” utility revenue from electricity sales.

Power utilities' revenues are traditionally tied to the volume of electricity they deliver, encouraging growth in electricity consumption rather than encouraging efficient use. Instead, regulators could reward utilities for promoting energy efficiency and reducing energy consumption in society as a whole. For instance, the state of California has an incentive program that rewards and penalises the state's privately owned utilities by up to plus or minus $450 million depending on their energy efficiency performance[6].

Fiscal instruments, where implemented, have proven very effective. In some European countries, lower taxation levels exist for labor costs to reduce the investment costs of building renovation (e.g. France, Sweden, Switzerland). Another innovative way to promote investment in energy efficiency and carbon reduction is to offer tax concessions to companies that make concrete commitments for energy efficiency gains as well as carbon reduction, and meet their target. In 2007, the Italian government set up a scheme that provides a gross tax deduction of up to 55 percent of the amounts payable by taxpayers for a wide range of equipment such as condensing boilers, A+ rated refrigerators[7], electric motors, lighting equipment and for energy efficiency building refurbishment[8]. South Africa has recently introduced tax regulations that will allow businesses to obtain notional deductions for income tax purposes for energy efficiency savings.

### Technical support

Programmes to promote energy efficient industrial systems can also be highly cost effective. Public technical assistance is therefore very valuable. The European Commission offers technical assistance to companies seeking to improve the energy efficiency of their electric motor driven systems, through the Motor Challenge Programme[9]. China has also begun offering technical support to improve energy efficiency at its 1000 most energy-intensive plants as part of a national effort to reduce energy consumption per unit of GDP by 20percent by 2010[10].

### Government support for Research, Development and Deployment (RD&D)

Government authorities should provide initial support for RD&D of effective energy-efficient technology. RD&D is essential to bring improved energy efficient technology to the market and to drive down cost and increase savings. An initial financial support from governments represents an efficient public investment because a larger market means that higher volumes will be produced, leading to lower prices. Demonstration projects have been shown to be useful in countries that have a low rate of market penetration, especially for commercial sectors (e.g. hotels) and public sectors (e.g., hospitals). Indeed, if the risk perception of emergent technologies prevents investment, government funded demonstration programmes aimed at increasing confidence and disseminating information and awareness among potential adopters are justified. This process will eventually eliminate other subsidies that are necessary to overcome the first cost and investments barriers.

However, although public budgets for energy RD&D in leading economies expanded after the two oil shocks in the 1970s, such budgets fell sharply after the 1980 peak and this trend has not been reversed markedly since then.

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[6] *The case for investing in energy productivity – McKinsey Global Institute, http://sefi.unep.org/fileadmin/media/sefi/docs/Investing_Energy_Productivity_McKinsey_report_Feb08.pdf*

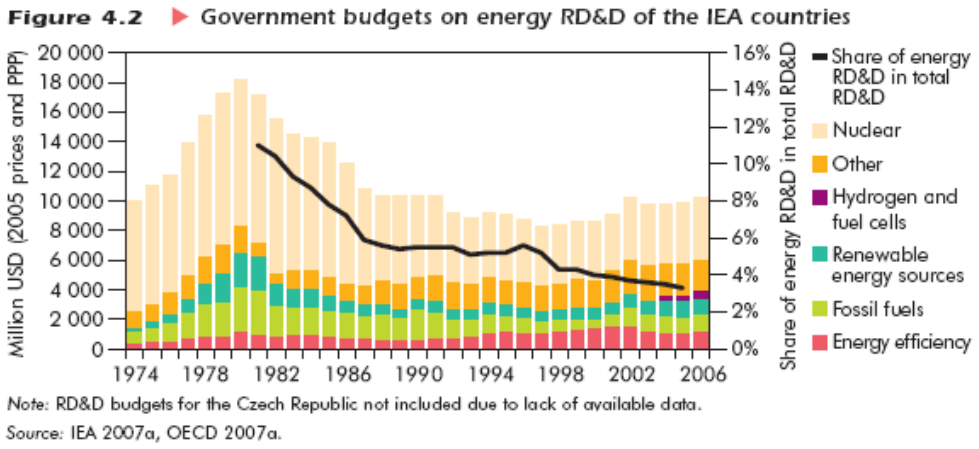
[7] *According to several different EU Directives (92/75/CEE, 94/2/CE, 95/12/CE, 96/89/CE, 2003/66/CE) most white goods, light bulb packaging and cars must have an EU Energy Label clearly displayed when offered for sale or rent. The energy efficiency of the appliance is rated in terms of a set of energy efficiency classes from A to G on the label, A being the most energy efficient, G the least efficient. In an attempt to keep up with advances in energy efficiency, A+ and A++ grades were later introduced for refrigeration products.*

[8] *Italian Energy efficiency Action Plan 2007, Ministry of Economic Development (Italy), http://ec.europa.eu/energy/demand/legislation/doc/neeap/italy_en.pdf*

[9] *The Motor Challenge Programme, re.jrc.ec.europa.eu/.../motorchallenge/index.htm*

[10] *China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China, Berkeley National Laboratory, http://ies.lbl.gov/iespubs/LBNL-519E.pdf*

**Government budgets on energy RD&D of the IEA countries**
Government expenditures on energy RD&D have declined compared to the level seen during the late 1970s and early 1980s.




## 2. Implementing innovative market mechanisms

Energy improvements require the existence of a market for energy efficiency. Currently the market is weak and perceived as too risky. Enlarging it will demand increased certainty before private actors are willing to further engage. New instruments such as standards, labels, partnerships between public and private sectors can help reinforce certainty.

### Standards and building codes

Government efficiency standards have been shown to be an effective, low-cost way to coordinate a transition to more efficient products. With the implementation of such standards, production volumes increase and economies of scale emerge so that prices for energy-efficient products typically decline to the level of the old, less efficient products. Rather than regulating the use of specific technologies, standards are more effective if they set targets for overall efficiency and leave room for company innovation in ways to meet the target. For example, energy efficiency standards for appliances in China are expected to save 200TWh of electricity by 2009, equivalent to China's total residential sector electricity consumption in 200211. Japan introduced the 'Top Runner Program" in 1998 aiming to curb increasing energy consumption in the commercial and transportation sectors by improving energy efficiency in appliance and vehicles. The program uses a maximum standards value system under which targets are set based on the value of the most energy-efficient products on the market at the time of value setting. Since 1997, the energy efficiency of air-conditioners has improved by 70 percent and the fuel efficiency of passenger vehicles has achieved 22 percent improvement under the program[12].

In the building sector, national building codes that include energy efficiency considerations can be an effective tool to ensure that buildings are built to minimise energy use. Adopting and strengthening implementation of such policies is particularly important in developing countries where economic growth is driving large-scale new construction that risks locking in high long-term energy use if energy performance considerations are not adequately addressed. For example, Mexico alone is planning to build more than 20 million new homes by 2030 and thus the standards of today will define the energy efficiency of the building stock for many years to come.

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[11] *Clean Energy and Development; Towards an Investment Framework, IMF, http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002(E)-CleanEnergy.pdf*

[12] *Top Runner Program, IEEJ, http://www.eccj.or.jp/top_runner/index_contents_e.html*

In high income economies energy-efficient renovation of existing buildings needs to become a stronger focus as building replacement rates are low and the potential for cost-effective savings is high. Measures that can assist in this are the extension of building energy codes to apply to existing buildings each time there is a change of tenant, or sale plus the adoption of building energy performance certification (rating and labeling) and fiscal and financial incentives for energy efficient renovation to help overcome split incentive problems. In general, there is a need for a regular review and tightening of building codes with the ultimate aim of moving the building stock toward low or zero net-energy or carbon designs.

Coupling incentives with standards and building codes can also help guard against energy efficiency "rebound effect", where households and firms respond to lower energy bills by consuming more energy (e.g., leaving lights on, running air conditioner longer, etc).

### Labels and certificates

Information on energy performance may enable consumers to obtain information about the energy consumption of the product they buy, and stimulate the introduction of new, more efficient models. The investor/user or landlord/tenant dilemma – which refers to the discrepancy between the one who invests in energy efficiency and the one who benefits from energy efficiency – could be avoided if the investor is able to credibly transmit the information about the future cost savings arising from the investment and to enter into a contract with those benefiting from the investment. Labels enable such market transparency.

The US Energy Star Program[13] has improved the energy efficiency of buildings and products, such as refrigerators and copier machines. The EU has introduced a mandatory labeling system (through Energy Performance of Building Directive – EPBD) that will raise the profile of energy, especially in the residential sector[14]. In addition, voluntary labeling schemes (such as BREEAM, CASBEE, LEED, Minergie) have already raising awareness of building sustainability, and are beginning to influence market prices. A study of 9,000 home sales in Switzerland found that those with the Minergie label achieved a sales price 7 percent higher than comparable homes without the label[15].

White certificates schemes can also provide transparency and stimulate market adoption. White certificates are documents certifying that a certain reduction of energy consumption has been attained. They result from obligations or voluntary commitments on the part of producers, suppliers and distributors of oil, gas and electricity to undertake energy efficiency measures.

The United Kingdom was the first EU country to introduce such a scheme, combining its obligations on suppliers to save energy with the possibility of trading those obligations and the certificates. Italy started a scheme in 2005 and France in 2006. White certificates are an example of how to link public policies, with targets and timelines (e.g. the European Commission's target of cutting energy consumption by 20 percent by 2020) and market incentives (rewards towards energy efficiency targets)[16].

### Voluntary Agreements (VA) and Public Private Partnerships (PPP)

Voluntary Agreements are flexible solutions, and can be an effective alternative to mandatory minimum energy efficiency standards, as they have the built-in support of manufacturers and can be implemented more rapidly than regulations[17]. In the US, the EPA Climate Leaders partnership encourages individual

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*13 http://www.energystar.gov/*

*14 http://europa.eu/legislation_summaries/energy/energy_efficiency/l27042_en.htm*

*15 Study conducted by the Center for Corporate Responsibility and Sustainability, University of Zurich, in Energy efficiency in Buildings - Transforming the Market, http://62.50.73.69/transformingthemarket.pdf*

*16 For more information about white certificates; European experience of white certificates, World Energy Council, http://www.worldenergy.org/documents/white_certificate.pdf*

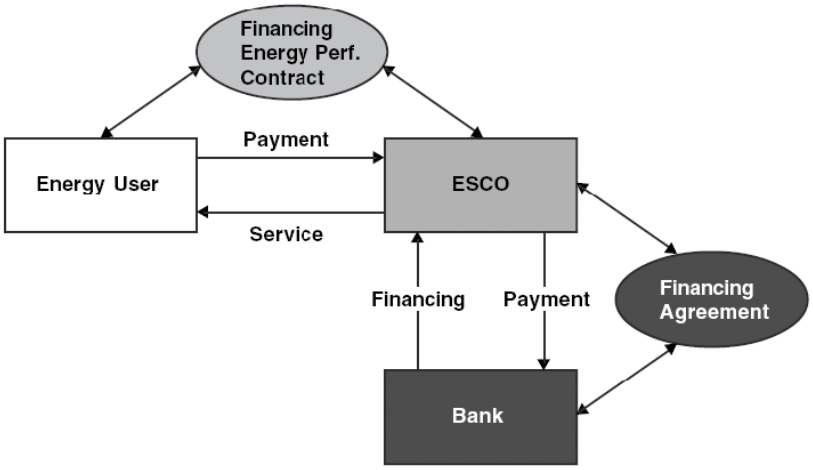
*17 Case Study N°3: The Mexico GHG Program*
*Case Study N°7: The National Business Initiative in South Africa*

commercial and manufacturing companies to develop long-term, comprehensive greenhouse gas emissions reduction strategies[18]. In Finland, voluntary agreements between the national government and public and private sector actors are common. They currently cover around 60 percent of final energy use in the eight sectors they cover. The objective is that 90 percent will be covered by 2016. Government subsidised energy audits are used to determine the potential and set targets to be achieved. Monitoring and evaluation ensures bottom-up feedback on the energy savings achieved[19].

### Energy Performance Contracting

Energy Performance Contracting (EPC) consists in procuring energy efficiency as a service. Through innovative contracts, ESCOs (energy service companies) or other providers guarantee a specified energy performance and energy savings to the customer. In exchange they share the savings with the latter. If the project does not provide returns on the investment, the ESCO is often responsible to pay the difference. Policies and incentives can be introduced to kick-start and catalyze the ESCO industry. The examples of the most successful ESCO host countries e.g. China, the United States and Germany have shown that direct and indirect governmental support to EPC as well as the exemplary role of the public sector in initiating energy-efficiency change through ESCOs is crucial to kick-start a sustainable ESCO industry. EPC in the public sector is especially important as it does not only help reduce energy costs in this sector, but also triggers the development of the ESCO-market and demonstrates the advantages of EPC to the economy in general[20].

**Mode of operation of ESCOs**




Source: ECS Third party financing Achieving its Potential (2003)

### Leveraging Private Finance

Because of the pressures on public finance, new innovative financial schemes have been recently designed to attract private funds into energy efficiency programmes. These innovative funds use tools traditionally used by the private sector (e.g. loans, equity participation, venture capital) and seek a partnership between public institutions and private investors, such as banks or ESCOs. These funds which prioritize operations with high investment costs should help develop a market for energy efficiency that would be "self-sustaining" without public intervention. Guarantee funds and revolving funds are examples of innovative approaches that have been developed in different parts of the world.

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[18] *www.epa.gov/stateply*

[19] *Role of voluntary agreements in Finnish energy policy on energy efficiency - application for the directive on end-use efficiency and energy services, http://www.nordicenergyperspectives.org/leskela080514.pdf*

[20] *Case Study N°4: Japan Facility Solutions*

Innovative ways of motivating the consumers to use such funds can be found in schemes where a loan is reimbursed through the electricity bill, as in the fund used to finance solar water heaters in Tunisia[21]. In the building sector, local authorities can provide loans to finance the energy investment, and repayments are made through an addition to the property tax charge.

## 3. Reinforcing international cooperation

### International cooperation to promote harmonized policies and mutual recognition

International cooperation on energy efficiency policies can help trigger synergies that foster technology improvements, principally through the removal of barriers in the deployment of technologies in the market place. Coordinated policies and standards are critical for enhancing global trade. The mutual recognition of energy labels should be encouraged. For example, the US and the EU signed an agreement in 2000 to co-ordinate energy efficiency labelling programmes for office equipment through the common use of the Energy Star programme logo and specifications[22]. More recently, the International Partnership for Energy efficiency Cooperation (IPEEC) was launched in May 2009 between G-8 countries and emerging countries, with the aim to inventory national energy efficiency policies, to share best practices on programme development, public procurement, industrial plant audits, training, public awareness efforts, and to identify areas of joint actions to facilitate energy efficiency improvement[23].

### Transparency and comparative information

Comparative analysis of energy and carbon emissions performances of industries across countries can help value best practices and set common indicators and targets. In Europe, the ODYSSEE project aims to establish and produce energy efficiency indicators for the various sectors of the economy (industry, transport, etc.) with a detailed breakdown by usage, i.e. heating, cooking, domestic hot water, and household appliances. The aim is to set up a permanent technical structure to monitor annual progress in energy efficiency and carbon emissions, nationally and at the European level. Each national team (usually energy efficiency agencies such as the ADEME in France) is in charge of providing the best data available. In the US, the Green Grid, a global consortium dedicated to data centre efficiency, working towards new operating standards and best practices, has attracted support from industry. The Green Grid does not endorse any vendor-specific products or solutions and seeks to provide industry-wide recommendations on best practices, metrics and technologies that will improve overall data centre energy efficiencies.

Other examples in more specific sectors include forums such as the International Council of Forest and Paper Association (ICFPA) and the Cement Sustainability Initiative (CSI). The members of these international forums have developed carbon calculation tools to facilitate uniform carbon emissions reporting, worked together to harmonise the global definitions for energy use and energy efficiency. Such global cooperation often includes non-governmental organisations (NGO)[24].

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[21] *At the beginning of the 1980s and then again in 2005 programmes were set up to finance Solar Water Heating (SWH) systems through credit sales and monthly repayments through consumers' electricity bills (PROSOL programme). The amount paid back through the electricity bill is calculated in such a way that it remains lower than the savings on electricity made by using SWH. About the PROSOL programme: http://www.medrec.org/en/download/PROSOLpercent20TUNISIA%202007.PDF*

[22] *http://www.eu-energystar.org/downloads/legislation/20061228/l_38120061228en00260104.pdf*

[23] *http://www.pi.energy.gov/documents/IPEEC_Terms_of_Reference.pdf*

[24] *Case Study N°7: Lafarge and WWF*

Benchmarking also provides valuable indicators on energy efficiencies, operating expenses, manufacturing costs and return on investment. One of the most well-known programmes of this kind is the Energy Efficiency Best Practice Programme (EEBPP) introduced in the United Kingdom in 1989 and still widely used worldwide[25]. Its purpose is to advance and spread good practice in energy efficiency, to provide a nationally recognised knowledge base on energy efficiency measures, and to help inform and develop UK policy on climate change, sustainable development and competitiveness. More recently, comparison has extended to best practices for industrial production for example in the Netherlands with the "Benchmarking Covenant"[26].

### Technology Development and Deployment

Significant opportunities exist to enhance the use of existing efficient technologies. Often, technology development and deployment are inhibited by lack of an appropriate enabling framework. More needs to be done to drive increased development and deployment of more efficient technologies and provide broader markets for innovative technologies in the future. The Asia-Pacific Partnership on Clean Development and Climate (APP) is one key example[27].

In addition, Japan established the “Japanese Business Alliance for Smart Energy Worldwide (JASE-World)” in 2008 aiming to promote technology and know-how on energy conservation globally as well as to build a system for advancing the spread of energy efficiency businesses. JASE-World is a government-business partnership, and consists of 57 companies, 19 business organisations, financial institutions and Japanese ministries, and published Japanese State-of-the-art Smart Energy Products & Technologies to introduce energy efficient technologies[28].

## 4. Creating new management approaches

Businesses have implemented energy efficiency measures along the value chain in many ways. For example by improving and becoming more efficient in the mining and processing of resources such as coal and steel, improved manufacturing of products, transport and delivery, enhancing consumer utilisation of products, and by developing more efficient products and services.

### Energy Management Systems and Process Integration

Many companies have developed Energy Management Systems (EMS) in the spirit of the coming ISO 50001: energy management standard (currently a Committee Draft and expected to be approved and released in 2010), through systematic and general methods for designing integrated production systems, ranging from individual processes to total sites, with special emphasis on the efficient use of energy. Process integration technology, design and analysis iterations during the conceptual stage of a building project between Architecture, Engineering, and Construction (AEC) professionals, District Heating and Cooling (DHC) systems in place of individual systems, are examples of business integrated approaches[29]. Information and communication technology (ICT) are particularly valuable to reduce energy consumption in design, commissioning and operation. Because decision-makers are often unaware of their energy consumption, technology can help to raise awareness of energy waste and reduce the level of waste. Energy monitoring, through sub-metering, relevant benchmarks and computerised information systems have already proven very effective in many companies[30].

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[25] *About the EEBPP; http://www.greenconsumerguide.com/article12.html*

[26] *http://www.benchmarking-energie.nl/pdf_files/covteng.pdf*

[27] *For more information on technology transfer please see ICC Discussion Paper on “Technology Development and Deployment to Address Climate Change” November 2008*

[28] *About the JASE-World ; http://www.jase-w.eccj.or.jp/eng/index.html*

[29] *Case study N°9 : The Solaire Building in New York*

[30] *Case Study N°1 : Statoil and ABB*
*Case Study N°2 ; IBM’s Enterprise Energy Management System*

It is especially important to identify and optimize efficiency improvements along the value chain and not solely on a project by project basis. For example, in the chemical and petrochemical industry, although there is negligible waste in the primary production of plastics as any scrap is recycled, waste plastics recycling and energy recovery rates of post-consumer plastics from end-of-life products are relatively low in many countries. More life-cycle indicators should be developed to give credit for the renewable feedstocks and waste plastics use for recycling or energy recovery.

### Implementing Demand Side Management (DSM)

An improved management of demand entails actions that influence the quantity or patterns of use of energy consumed by end users, such as actions targeting reduction of peak demand during periods when energy-supply systems are constrained. Peak demand management does not necessarily decrease total energy consumption but could be expected to reduce the need for investments in networks and/or power plants. Energy utilities have therefore a great interest in implementing a demand side management program. For example, smart meters that indicate individual appliance consumption can alert users to waste. Power utilities can also alert users to excessive consumption by providing comparative information about energy use on the bill or through the internet, as already happens with some consumers in Japan and the UK[31].

Many companies today make efforts to educate employees, customers and the general public through focused communication, interventions, demonstration of energy efficient technologies and regular feedback on both successes and failures. By encouraging energy end users to capture the savings available to them, companies therefore have a key role in mobilizing for an energy-aware culture[32].

### Identifying energy efficiency opportunities in infrastructures and operations

A growing number of companies have integrated energy efficiency into business practices, e.g. in investment and procurement processes. For example, a new business approach consists in changing the rules to invest in energy savings by changing the analyses of the life cycle costs of energy efficiency investments, identifying lower discount rates for energy efficiency investments, taking into consideration future energy prices and identifying the multiple benefits from energy efficiency investments[33].

### Improving long-term energy efficiency through maintenance, audits and reporting

Inspections and maintenance are key elements to ensure energy efficiency on the long term. Without proper maintenance of energy consuming equipment (e.g. boilers, vehicles), efficiency is bound to decrease over time. For example, under the Asia-Pacific Partnership on Clean Development and Climate (APP), Power Generation and Transmission Taskforce, a series of “peer review activities” have been implemented among the plant engineers and mangers of APP countries including China and India, in order to share the best practices of proper operation and maintenance for aged coal-fired power stations[34]. At the same time, energy consumption reporting and energy audits – which are increasingly made mandatory in many countries – enable companies to monitor closely their energy performance.

Energy audits are essential for all sectors of the economy (including residential/tertiary sector buildings as well as industrial sector and transport companies) to promote a better understanding of the current status of end-use energy efficiency. The audits, which are usually coordinated by engineering or facility departments, will not only create awareness among those who are functionally involved in the management of energy but also justify the necessity for retrofitting activities and the implementation of new energy efficiency activities.

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[31] *In May 2009, the UK government launched a plan to fit all 25m households in the country with compulsory “smart meters” by 2020, paid for by firms. The estimated net benefits are between £2.5 billion and £3.6 billion over the next 20 years. For more information: http://www.metering.com/node/15221*

[32] *Case Study N°8 ; Eskom*

[33] *Case Study N°5 ; Roche*

[34] *About the Peer Review Activities ; http://www.fepc.or.jp/english/environment/asia-pacific/index.html*

# Conclusion

ICC and its members are convinced that energy efficiency makes good business sense and enhances competitiveness. It is a critical part of the global evolution towards a more sustainable energy future, as is one of the most cost-effective way to cut greenhouse gas emissions. Existing market drivers already offer powerful incentives to improve energy efficiency. Technology solutions and policy frameworks exist today that can improve energy efficiency and technological innovation will continue to add solutions over time. An increasing number of firms have well-established energy management systems to capture benefits that have demonstrated impressive results.

Within each region, clear energy efficiency action plans are needed to identify the range of measures that will work with markets to improve information and lower barriers to deployment of economic solutions. To capitalise on the improvements that can be made through technology transfer, barriers need to be identified and removed as well as improving the national and international frameworks that support clean development.

Business supports energy efficiency and given the right fiscal and regulatory frameworks can do more to help governments achieve the triple objectives of growth, jobs and environmental improvement. ICC and its members are prepared to share experience and describe the benefits of modern energy management systems in identifying, prioritizing and implementing energy efficiency. Please review the attached Annex 1 of this document to see concrete examples of actions companies have taken to deal with greenhouse gas emissions and enhance energy efficiency.

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# Glossary of terms

| | |
|---|---|
| **ADEME** | Agence de l'Environnement et de la Maîtrise de l'Energie / French Agency for the Environment and Energy Control |
| **AEC** | Architecture, Engineering and Construction |
| **APP** | Asia-Pacific Partnership on Clean Development and Climate |
| **BREEAM** | Building Research Establishment Environmental Assessment Method |
| **CASBEE** | Comprehensive Assessment System for Building Environmental Efficiency |
| **CFL** | Compact Fluorescent Lamp |
| **CHP** | Combined Heat and Power |
| **CSI** | Cement Sustainability Initiative |
| **CO2** | Carbon dioxide |
| **DHC** | District Heating and Cooling |
| **DSM** | Demand Side Management |
| **EEBPP** | Energy Efficiency Best Practice Programme |
| **EMS** | Energy Management System |
| **EPA** | U.S. Environmental Protection Agency |
| **EPC** | Energy Performance Contracting |
| **ESCO** | Energy Service Company |
| **GDP** | Gross Domestic Product |
| **GHG** | Greenhouse Gas |
| **IEA** | International Energy Agency |
| **ICFPA** | International Council of Forest and Paper Association |
| **ICT** | Information and Communication Technology |
| **IPEEC** | International Partnership for Energy Efficiency Cooperation |
| **LED** | Light-Emitting Diode |
| **LEED** | Leadership in Energy and Environmental Design |
| **PPP** | Public Private Partnerships |
| **RD&D** | Research, Development and Deployment |
| **WEO** | World Energy Outlook |
| **VA** | Voluntary Agreements |

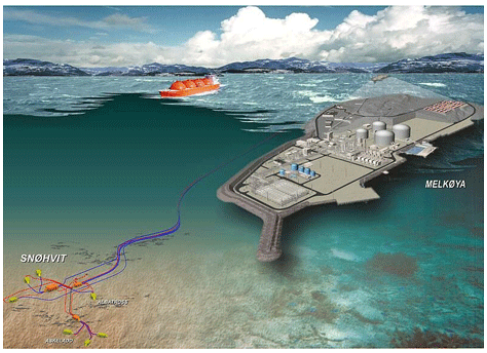
# ANNEX – Case Studies Energy Efficiency

1. Statoil Hydro and ABB
   Using Communication and Information Technologies to improve Energy Efficiency
2. IBM
   Raising awareness of energy consumption and opportunities
3. The Mexico GHG Program
   A Nationwide Voluntary Agreement
4. Japan Facility Solutions (TEPCO Group)
   Providing Energy Efficiency as a service
5. Roche
   Taking Advantage of Energy Policies and Changing the Rules to Invest in Energy Savings
6. The National Business Initiative in South Africa
   A partnership between the government and industry-wide businesses to foster overall energy efficiency
7. Lafarge and WWF
   Working together for Energy Efficiency
8. Eskom
   Implementing a Demand Side Management Program
9. The Solaire Building in New York
   Implementing an innovative Building Management System
10. British Telecom Italia
    Minimizing environmental impacts through the use of natural resources
11. Deutsche Telekom
    Helping to protect the climate with green IT
12. Telstra and Ericsson
    Using the latest technology to enable mobile broadband coverage with reduced energy consumption per subscriber
13. Microsoft
    Greening the Microsoft Dublin data centre
14. Microsoft and Fiat
    Reducing CO2 emissions by influencing drivers' behaviour
15. GDF SUEZ
    Better energy efficiency thanks to a long term, large scale and mixed solutions
16. Vattenfall
    Nordjylland power station – the world's most efficient coal-fired combined heat and power plant
17. Association of German Chambers of Industry and Commerce (DIHK e.V.)
    The European Energy Manager

# Case Study N°1

## Statoil Hydro and ABB

### Using Communication and Information Technologies to improve Energy Efficiency


Established in 1972, Statoil is Norway's leader in the oil and gas industry, and a seller of crude oil and supplier of natural gas to Europe. In 2006, Statoil began work on the Snovhit project, Europe's first Liquefied Natural Gas facility, designed to produce LNG from underwater fields on the Norwegian Continental Shelf for export to Europe and the USA.

Due to the complexity of the project and the difficulty of managing an extraction system at depths of up to 350m, Statoil turned to ABB for assistance in providing reliable communications and information systems that would increase energy efficiency. ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact.

#### ❖ Reduced Costs + Greater Operating Reliability = Superior Margins

Operating at great depths and in a harsh environment, Statoil needed a system that was reliable, environmentally safe, and that would also help increase the company's competitiveness by reducing costs. For this project, ABB provided an Industrial IT Safety and Automation System (SAS), Power Distribution control system, electrical and drive systems, and field instrumentation. More than 4000 instruments are seamlessly connected through the Profibus interface, and an Industrial IT ABB life-cycle simulator ensures that the design, engineering, startup, and operation of this integrated system proceeds smoothly. According to Statoil, selected technology will also ensure an energy efficiency of 70 percent, "the best result obtained so far for such a facility."

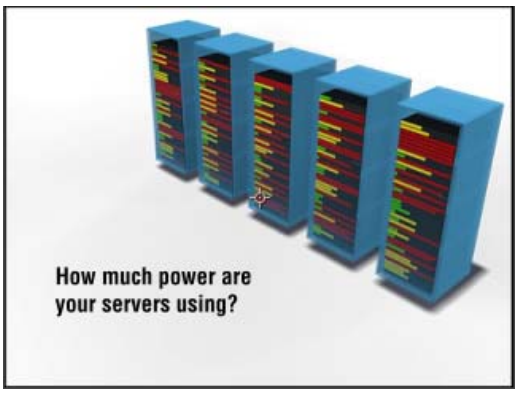
#### ❖ Results: Significant Reductions in Energy Use and Lower Costs

With the reliability and efficiency of the ABB systems, Statoil was able to set a record for piping unprocessed well streams over long distances. The new ABB systems provide for highly integrated information access and navigation, reliable operation in environmentally sensitive areas and improved energy efficiency. All of these benefits drastically lower operating and maintenance costs, providing Statoil with a direct competitive advantage.

# Case Study N°2

## IBM

### Raising awareness of energy consumption and opportunities




IBM, a multinational computer technology and IT consulting corporation, is a global leader in technology manufacturing, server and storage equipment, software and IT business services and solutions.

More than 386,000 employees in over 90 countries across the globe create, develop, and manufacture computer and storage systems, microelectronics, and software systems and applications and provide a wide range of professional business solutions and IT services.

#### ❖ Implementing an Energy Management System

The IBM Real Estate and Site Operations (RESO) group is responsible for energy management programs across IBM's operations. The energy management team has energy engineers assigned to major locations and regions that cover all of IBM's major operations.

To meet the company's goal of achieving annual energy use avoidance and reductions equivalent to 3.5% of the company's energy use in 2007, the group implemented an Enterprise Energy Management System (EEMS) to enable real time energy use monitoring at IBM locations.

#### ❖ Seizing opportunities for energy conservation

IBM’s energy conservation program provided an effective methodology for performing ongoing optimization of building and system operations that would utilize real-time baseline energy use from a regular, periodic (every 15 minutes) collection of building, system and facility level electrical use.

Collection of electrical use over the day provides a view into two important factors – anomalies in energy use such as short-term transients of high electrical use and increases in electrical use over time against a baseline electrical use profile.

#### ❖ Results and lessons learned

This system has enabled IBM to identify more than 105 energy conservation projects over 2005 and 2006 that resulted in a total savings of 16,500 MWh of electricity and US$ 1.35 million for the company.

The implementation of the EEMS data collection system demonstrated that real-time collection and display of energy-use data could reveal energy-use patterns that are not seen through a review of the monthly utility bills. Real-time evaluation of energy use can identify intermittent patterns or gradual changes in established baseline energy use that indicate opportunities to reduce energy consumption.

# Case Study N°3

## The Mexico GHG Program

### A Nationwide Voluntary Agreement

Mexico is the world's fifth biggest oil exporter, and second only to Brazil in greenhouse gas (GHG) emissions in Latin America. Its government recognizes that adapting to a carbon-constrained world is both a strategic risk and opportunity for the country's economy. In 2004 the government sought to mobilize business action and launched the Mexico GHG Program. Following the maxim that you cannot manage what you cannot measure, the program was set to encourage companies to voluntarily map their emissions.

#### ❖ A multilateral collaboration

The program was launched through a three-way collaboration between the government environment ministry SEMARNAT, the WBCSD's Regional Network partner BCSD Mexico and the WRI/WBCSD GHG Protocol team.

In 2007, there were 54 participating companies, of which 35 had reported their emissions. The reported emissions cover approximately 35% of the industrial emissions across the Mexican economy. Members include both Mexican headquartered multinationals such as CEMEX, and Grupo Bimbo, the Mexican arms of multinational companies such as Sumitomo, Caterpillar, Holcim and Ford, as well as local firms and public bodies. Participation is focused on the most-energy intensive sectors and includes the entire cement and petroleum sectors, as well as major representatives of the iron and steel sector.

#### ❖ Providing tools for GHG measurement

The Mexico Greenhouse Gas (GHG) Program enables companies to prepare a GHG inventory that represents a true and fair account of their emissions, and that can be used to build an effective strategy to manage and reduce emissions. The initiative reduces the cost and complexity barriers to compiling GHG inventories, helps increase transparency, and ensures that GHG measurement is consistent with internationally recognized measures, enabling participating companies to stay “ahead of the curve” in anticipating and addressing GHG-related risks and opportunities.
Key activities of the Mexico GHG Program include:

- Translating the GHG Protocol Corporate Standard and associated guidance into Spanish.
- Hosting awareness raising and training workshops to introduce Mexican companies to the standard.
- Providing in-depth workshops, and ongoing coaching and support to companies committed to implementing the standard.
- Developing specific accounting and reporting specifications customized to Mexican industry needs.
- Publishing participating company GHG inventories on the project website.
- Hosting public recognition events for companies reporting on their emissions.

By providing an opportunity for companies to work closely with the government in implementing this voluntary program and designing a national climate change strategy, the program has created a new incentive for them to engage on the policy developments needed for Mexico to remain competitive in a carbon-constrained world.

# Case Study N°4

## Japan Facility Solutions (TEPCO Group)

### Providing Energy Efficiency as a service

Japan Facility Solutions (JFS), a TEPCO group company, is a leading ESCO actively promoting energy efficiency in large buildings such as commercial complexes, universities and office buildings. JFS guarantees a certain level of cost reduction through energy savings with a performance contract, along with the corresponding reduction of CO2 emissions. If the guaranteed reduction of energy costs is not achieved, JFS compensates for the shortfall. This means that customers can realize energy saving and CO2 reduction at virtually no risk.

Over the past eight years, JFS has implemented more than 80 ESCO projects, and in 2008, it achieved annual reductions of CO2 emissions totaling approximately 26,600 tons. In 2007 and 2008, JFS won the first award of excellent ESCO projects held by the Energy Conservation Center, Japan.

#### ❖ An example of a successful ESCO-project: Tokyo Metropolitan Hiroo General Hospital

The project at Tokyo Metropolitan Hiroo Hospital is one of the most successful ESCO-projects proposed and implemented by JFS.

In October 2005, the hospital made a 6-year guaranteed saving contract with JFS, which stipulated an energy consumption reduction of 28.2% and a targeted utility cost reduction of 72 million yen per year at construction costs for the renovation amounting to 310 million yen.

Various energy saving techniques were applied, such as optimizing cool and re-heat process in double-coil air handling units (AHUs) to reduce air-conditioning load, renewing refrigerators from conventional chiller to inverter chillers, introducing free cooling system, and increasing the efficiency of transporting heat through various controls.

#### ❖ Results

Thanks to the renovation, the annual performance factor of the heat-source system has become approximately twice as high as before. The achieved energy consumption savings in the first fiscal year 2006 exceeded the targets. 114% achievement was made in primary energy consumption; 116% achievement in CO2 emissions; and a more than 82 million yen reduction in the utility costs.

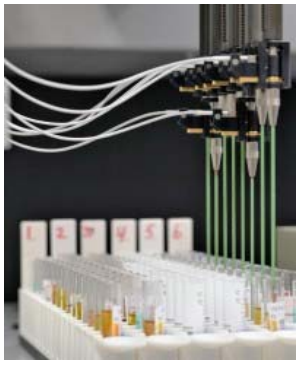
#### ❖ Government measures to support the ESCO industry

The Japanese government has introduced supportive measures for ESCO projects through subsidies, low-interest loans and tax incentives (the Tax Incentive System for Promotion of Investment in Reformation of Energy Supply and Demand Structure). The New Procurement Law for the Environment, enacted in 2007, encourages authorities to procure ESCO services for public buildings, for which contract periods can be extended to 10 years. These measures are expected to promote and activate the Japanese ESCO market further.

# Case Study N°5

## Roche

### Taking Advantage of Energy Policies and Changing the Rules to Invest in Energy Savings



As a research-focused healthcare company, Roche discovers, develops and provides innovative diagnostic and therapeutic products and services that deliver significant benefits to patients and healthcare professionals – from early detection and prevention of diseases to diagnosis, treatment, and treatment monitoring. Roche employs about 80,000 people and sells its products in over 150 countries.

Since 1996, the company has doubled its energy efficiency, saving money as well as reducing the intensity of its environmental impact.

In 2005, it set itself a new goal of reducing energy consumption by a further 10% over the next five years, on a per employee basis.

But energy managers had already attacked the "low hanging fruit" of low-cost, no-cost and quick to pay-back energy efficiency opportunities. In competing for limited capital, they were beginning to come up against investment hurdles that made it difficult for them to demonstrate the feasibility of energy conservation investments.

#### ❖ Integrating long-term energy efficiency savings in investment calculations

The problem they faced was that simple payback and return on investment calculations tend to underestimate the cost savings from energy efficiency investments. They then decided to take into account these savings, as well as other benefits such as lower emissions, reduced exposure to energy price fluctuation, increased staff comfort and better public relations. So Roche changed the rules by which it assessed the net present value of energy conservation measures in order to capture the true balance of costs and benefits of energy efficiency investments:

- **Lower discount rates** : Energy efficiency investments are less risky than normal pharmaceutical investments, thus requiring lower discount rates ;
- **Future energy savings** : Future energy costs will keep rising, which makes future energy savings more valuable ;
- **Multiple benefits** result from energy efficiency investments: increased comfort, productivity, environmental benefits, utility rebates from energy providers and government grants ;
- **A full life-cycle analysis** enables to take into account the impacts of energy and all other costs (investment, maintenance…) over the expected life of the asset in the balance between present costs and future savings.

This methodology allows Roche to rigorously compare different design alternatives and select the most profitable contender, which will also be the most energy efficient because of the strong emphasis on future costs.

#### ❖ Results: significant reductions in energy use

In the two years since this methodology was introduced, Roche has managed to reduce energy use per employee by 8%, despite growing the business and incorporating new enterprises.

# Case Study N°6

## The National Business Initiative in South Africa

### A partnership between the government and industry-wide businesses to foster overall energy efficiency

Established in 1995, the National Business Initiative (NBI) is a voluntary group of leading national and multi-national companies, working together towards sustainable growth and development in South Africa through partnerships, practical programmes and policy engagement. Its 140 member companies include both multinationals such as ABB, Anglo American, BP, Holcim and IBM, and South African companies including ESKOM, Sappi and Pick'n Pay.

#### ❖ The Energy Efficiency Accord: fostering initiatives through interaction

The Energy Efficiency Accord was signed in May 2005 between over 30 business leaders and the Minister of Minerals and Energy as a voluntary effort to implement the National Energy Efficiency Strategy, agreeing to *"collaborate to establish a mutually beneficial framework for voluntary energy efficiency initiatives that will help move the country towards its goals of attracting investment in Clean Development Mechanism (CDM) projects and efficient energy use."*

Industry participants acknowledged the target of reducing demand by the industry and mining sector by 15% (allowing for economic growth) and committed to taking individual and collaborative action to:

- Develop sector specific strategies, targets and projections;
- Promote the use of demand side management contracts;
- Develop common and robust reporting protocols;
- Develop a generic energy auditing protocol.

NBI acts as secretariat for the Accord. An Energy Efficiency Technical Committee, comprising representatives from both industry and government, was established with a mandate to facilitate the development of suitable institutional mechanisms, measurement and reporting frameworks.

The Committee:

- **Progresses the terms of the Accord**, through agreement of targets, measurement protocols and other necessary steps to industry wide implementation;
- **Shares best practices**, with different companies taking turns to share experience and results at each meeting;
- **Puts peer pressure** on each other to put commitments into action;
- **Identifies and solves common problems** and obstacles;
- **Fosters relationships**, both between the small but growing cadre of energy managers in industry, and with others outside, such as those in government, regulation and energy supply;
- **Interacts with government**, by providing an industry sounding board on these issues;
- **Enables training opportunities** to build implementation across the signatory companies, for example holding monitoring and verification and Clean Development Mechanism workshops.

### ❖ Outcomes and future challenges

The hard work of the NBI and the technical committee members have put in place crucial foundations for action by member companies, including commitment from an expanded number and range of companies, sectors and tools for measuring and verifying performance, setting baselines and taking economic growth into account.

A fast-track regulation would have presented the risk of imposing inappropriate approaches before South African industry had a chance to develop solutions tailored to different sectors. This initiative assumes that dialogue is more effective to set common objectives than command and control measures. However the priority for the Accord now is to both accelerate and demonstrate real progress. The participants plan, in the next year, to enable the commitment to setting sector targets and to publish a consolidated report from all the companies, with robust measures of performance, and explanation of the opportunities, barriers and strategies in each sector.

# Case Study N°7

## Lafarge and WWF

### Working together for Energy Efficiency

The Lafarge Group is a world leader in building materials - cement, roofing, aggregates, concrete and gypsum. With more than 84,000 employees in 79 countries, Lafarge posted sales of Euros 19 billion in 2008. Several of its activities rely on the transformation of raw materials such as limestone or gypsum into construction materials.

Lafarge's environmental policy has increasingly emphasized the development of long-term dialogue with its stakeholders and the establishment of a genuine partnership with society. The best illustration of this is the pioneering partnership it signed in March 2000 with WWF, one of the largest global conservation organizations, with the aim to improve its environmental performance and contribute to raising standards in industry. In 2005, this partnership was renewed for a further three years.

#### ❖ Defining jointly environmental performance indicators

With the aim of highlighting areas for priority action and monitoring its progress on environmental issues, the Lafarge Group has identified the most relevant environmental performance indicators in conjunction with WWF and defined quantified targets for improvement for each division according to a detailed calendar, more particularly in energy consumption, in energy recycling, and in waste production, recycling and recovery. These indicators make it possible to assess progress achieved in the energy efficiency and the protection of the environment, and guarantee the transparency of the actions carried out by Lafarge.

#### ❖ Committing to ambitious $CO_2$ reduction targets in cement production

In 2001, Lafarge joined the WWF Climate Savers Program (major businesses prepared to make innovative efforts to mitigate climate change as part of their corporate responsibility; the Program demonstrates profitable and practical approaches to reducing $CO_2$ emissions and supports business efforts to implement carbon management strategies) and agreed to a set of greenhouse gas emission reduction targets.

#### ❖ Results to date

Since signing the WWF Climate Savers agreement, Lafarge has made significant progress towards its reduction targets. It achieved a 14.2% reduction of absolute $CO_2$ emissions below 1990 levels and a reduction of 11.2% per metric ton of cement compared to 1990 levels.

Lafarge publicly reports these indicators in its Sustainability Report and $CO_2$ emissions are monitored and independently verified on an annual basis.

# Case Study N°8

## Eskom

### Implementing a Demand Side Management Program

Eskom is a South African electricity public utility created in 1923. The utility is the largest producer of electricity in Africa, is among the top seven utilities in the world in terms of generation capacity and among the top nine in terms of sales. South Africa's marked economic growth in recent years has propelled electricity peak demand to rise at around 4% a year. Eskom is addressing this challenge by the expansion of supply options, a return to services program for three mothballed power stations and its Demand Side Management (DSM) program.

Aiming to influence electricity usage patterns of electricity consumers, Eskom is implementing DSM in South Africa through collaboration with the Department of Minerals and Energy and the National Electricity Regulator. The DSM strategy comprises a dual approach: to reduce electricity demand at peak periods (07:00-10:00 and 18:00-20:00) by shifting load to off-peak periods and to reduce overall electricity consumption (24-hour reduction) by installing energy-efficient equipment and optimizing industrial processes. Sustainable DSM projects often involve a combination of both methods.

#### ❖ Raising awareness among consumers

The program includes a broad range of marketing and public relations activities, and feeds directly into programs in different income segments as well as residential, commercial, industrial and institutional program activities.

School programs are also implemented to highlight the benefits and importance of using electricity efficiently to school pupils. DSM seeks to increase the awareness of students and faculties on energy efficient measures by providing participating institutions with resource packs, including teacher, learner and electricity audit guides.

The 1999 launch of the local efficient lighting initiative called Bonesa was among the major milestones in the early phase of DSM in South Africa. The Global Environment Facility and Eskom jointly funded this over a period of 3 years. Now the use of compact fluorescent lamps (CFLs) through customer education, advertising and marketing is being promoted. The focus is to lower the price of energy efficient globes. Within a few years, the price for CFLs dropped significantly due to joint sales promotions with local suppliers and increased volumes of CFLs.

#### ❖ Results

With DSM everyone benefits in the following ways:

- Reduced electricity demand during peak periods, thus delaying additional capital investment to further increase electricity supply.
- Improved value of electricity service to customers by reducing costs – customers have a wide range of energy efficient options and financial benefits.
- Conservation of the environment by reducing emissions and water consumption of power stations.
- Support of macro-economic development through job creation and improved productivity.

# The Solaire Building in New York

## Implementing an innovative Building Management System

The Solaire Building is a 27-story, 293-unit, glass-and-brick residential tower in Battery Park City, a planned residential and commercial neighborhood bordering the west side of New York City's financial district.It is owned by Albanese Organization, Inc. and Northwestern Mutual Life, Corporation. It is the first building designed in accordance with new environmental guidelines instituted in 2000 by the Battery Park City Authority (BPCA), the government entity that has overseen the development of Battery Park City since 1969.

### ❖ A holistic design

Attention to individual design or technical solutions, such as natural ventilation or insulation, can lead to sub-optimal solutions. While each component may be valuable in saving energy, the greatest energy efficiency is achieved by taking a whole-system, integrated approach. The Solaire is the outcome of a new business model that overcomes the traditional segmented structure of the building industry and that accommodates early participation of a broad-based team: engineers, architects, material and equipment suppliers. This way, the building shell and appliance installations have been designed jointly to ensure maximal energy efficiency:

- A central HVAC (heating, ventilating, and air-conditioning) system was chosen for its energy efficiency and to maintain the integrity of the wall.
- Daylighting was maximized and balanced with the thermal envelope.
- Plumbing, electrical, and other penetrations through the building envelope were minimized, reducing air infiltration.
- Photovoltaic panels are located on the building's west façade and clipped onto the mechanical bulkhead on the roof.

### ❖ An effective monitoring

As well as other sustainability features, the Solaire contains a comprehensive Building Management System to control the entire building. This was built into the plans at the design stage, is continuously updated and undergoes an annual re-commission. The BMS provides real time monitoring and reacts to external stimuli, such as weather and daylight.

### ❖ An innovative approach for Demand Side Management

All residential units include programmable digital thermostats, Energy Star fixtures, and a master shut-off switch. Common areas include occupancy sensors to further optimize energy use.

The building's photovoltaic system is designed to operate at peak production coincident with peak demand on the local power grid. The building makes use of a gas-fired chiller, further reducing the electric load. This is especially significant during periods of peak demand when the New York City power grid does not have the necessary distribution system to accommodate demand. At these times, users rely on supplemental power provided by highly polluting generators. The gas-fired chiller in use at the Solaire reduces the need to rely on power from these highly polluting sources.

### ❖ Energy efficiency outcomes

Winner of several awards and recipient of the LEED Gold rating, the Solaire is 35% more energy efficient than building codes requirements and uses 67% less energy than other similarly sized buildings in peak hours. Since opening in 2002, energy consumption has decreased by 16% and as a result of its green credentials the developers have been able to charge a rental premium of 10%.

# Case Study N°10

## British Telecom Italia

### Minimizing environmental impacts through the use of natural resources

I.NET was established in Milan in 1994 and merged into BT Italia in 2008. It is a market leader in security and business continuity solutions for Italian internet-oriented businesses. Its service portfolio includes managed security services, server and application hosting with IT managed services, storage management, network management, multimedia content distribution, and business continuity consultancy.

### ❖ Challenge

Hardware generates heat and needs cooling to keep its operating temperature within a manufacturer-specified range. When equipment is co-located in a confined area such as a data centre, the problem is multiplied, even more so when the weather is hot. However, providing chilled air from conventional air conditioning has both cost and environmental implications.

### ❖ Looking for an alternative solution to conventional air conditioning

Working with local architects, I.NET identified a site near Milan that offered excellent seismic stability, was free from flood risk, and had no potential hazardous industrial activity nearby. More especially, the site comprised a naturally replenished waterbed 40 meters beneath the surface, which opened sustainable cooling possibilities.

Given that water can absorb about four times as much heat as air, the company developed an innovative solution which consists in using the natural water to lower the temperature of the data centre. Four wells were drilled and immersed pumps installed to bring the underground water to a specially constructed reservoir beneath the data centre floor. The data centre walls were designed to conceal the pipe work and to house a heat exchanger, as well as to completely isolate the water from the equipment. Cold water is pumped vertically into horizontal rings of pipe work serving cooling units on each floor of the building. Fans blow air through the cooling units, which enters a network of ducts leading to the equipment rooms. This process sees the water temperature rise from around 15° to 18° Celsius. The warm water is not wasted because it is piped away to farms in the region for crop irrigation.

### ❖ Value

By implementing the water-based cooling system at its Milan data centre using natural resources, I.NET has demonstrated environmental thought leadership. Under normal operating conditions power is now only used for the pumps that raise and circulate the water, and for the fans. This has reduced energy consumption by nearly one megawatt in comparison with powering a conventional air conditioning system. This way the company is saving around €800,000 a year, which can be passed on to the customers through attractive service pricing. There are strong sustainability dividends as well, as lower power consumption has reduced CO2 emissions by 4,200 tons a year.

# Case Study N°11

## Deutsche Telekom

### Helping to protect the climate with green IT

Deutsche Telekom AG is a telecommunications company headquartered in Bonn, Germany. It is the largest telecommunications company in Germany and in the European Union. As an international Group, Deutsche Telekom is represented in some 50 countries worldwide. More than half of its net revenue is generated outside Germany. The Company employs some 260,000 people overall. Deutsche Telekom's goal is to make information and communication technologies (ICT) as sustainable as possible. To this end, the company optimizes the energy balance of its networks and IT infrastructure.

#### ❖ Product carbon Footprint / Group Wide Carbon Footprint

To design climate-friendly products and services, Deutsche Telekom participated in a Product Carbon Footprint pilot project. The carbon footprint is made up of all greenhouse gas emissions that occur during the manufacturing, usage and disposal of a product. During this project, Deutsche Telekom analyzed the entire life cycle of T Home's Call & Surf package. The analysis showed that most of the emissions generated by the DSL and fixed network package are due to router operations. Energy-efficient switched-mode power supply units can help reduce energy consumption at precisely this point. Many devices at Deutsche Telekom such as phones and routers are already equipped with this technology. In the future, the results of the pilot project could help to establish the use of standardized product labels that indicate each product's carbon footprint.

The Group-wide “Carbon Footprint” project was launched in early 2009, with the aim of creating a transparent representation of the carbon footprint throughout the entire value chain, both at company level, in relation to Deutsche Telekom’s infrastructure and core processes, and at product level for all business area-specific core products.

#### ❖ Energy-efficient networks

T-Mobile modernized its mobile communications network throughout Germany in 2007. In the course of this change, it replaced its system technology and implemented the efficient Global System for Mobile Communications (GSM) network in over 20,000 base stations. The GSM network makes it possible to send data in the form of e-mails and images at high speeds via cell phone and, at the same time, saves up to 30-40 percent on energy.

#### ❖ Green data centres

Deutsche Telekom is the first company worldwide to test a biogas-powered fuel cell for use in data centres. At the T-Systems data centre in Munich, the fuel cell supplies computers and cooling systems with fully climate-neutral energy. The forage plants that are needed for biogas extraction are cultivated in the area around Munich. The facility is one of a series of projects that T-Systems has launched to ensure that data centres all over the globe can make as sparing use as possible of the available energy. In Singapore, a "green data centre" was inaugurated in 2008. The energy-efficient data centre operates with cutting-edge technology on an area covering almost 2,800 square meters. Water-based cooling systems for example ensure that cooling only takes place where it is needed. What is more, cooling with water makes it possible to operate without the harmful gases used in conventional cooling systems.

# Case Study N°12

## Telstra and Ericsson

### Using the latest technology to enable mobile broadband coverage with reduced energy consumption per subscriber

Building on an already successful partnership, Telstra and Ericsson continue to push the boundaries to create the world's most advanced mobile core network. An established five-year strategic transformation project has made Telstra's mobile core network the most innovative and successful in Australia. In October 2006 Telstra launched its Next G™ mobile network, reaching more than 99 percent of Australia's population. The company has gone on to improve peak network downlink speeds, from 3. 6 to 21Mbps, with a further upgrade to 42Mbps planned by the end of 2009.

The success of the Next G ™ network has helped drive the popularity of 3G services, accounting for more than half of its mobile market share.

#### ❖ The technology evolution: Significant Reductions in Energy Use and Lower Costs

Telstra's success has led to a rapid rise in subscriber numbers. This trend is set to continue and by 2011, Telstra expects data traffic to have grown by 600 percent. This increase in demand has led to a need for more capacity on the 'Next G™' core. To sustain this growth Telstra turned to a long-term partner: Ericsson. The new Mobile Softswitch Solution provides ultra-high capacity, supporting up to eight million subscribers with only two cabinets. The footprint can be as little as 10 percent that of existing servers and is estimated to save Telstra 556 MWh of energy over the next four years, due to lowered power consumption. This pioneering mobile switch provides outstanding node availability, ensuring mobile phone calls can be made without any service interruption. The benefits are clear for Telstra. It is a key part in the evolution to an all-IP network, while advanced technology allows for smooth expansion in the mobile core network, reduces node count, enhances network performance and lowers growth in opex and capex.

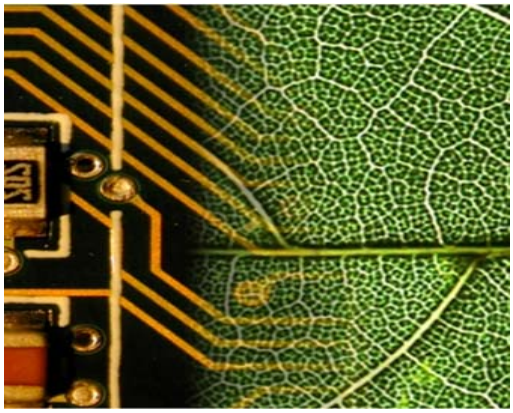
#### ❖ The future: Meeting demand growth more efficiently

The network transformation will continue to evolve. Mike Wright, Executive Director, Wireless Engineering, Telstra concludes: "We have a reputation for offering the broadest range of services and the best coverage so it is vital that we meet expectations. Our long-term partnership with Ericsson and the use of new mobile core technology enables us to meet growth in demand with a more resource efficient network."

# Case Study N°13

## Microsoft

### Greening the Microsoft Dublin data centre



Microsoft Corporation is a multinational computer technology corporation that develops, manufactures, licenses, and supports a wide range of software products for computing devices. The company has now become largely successful with global annual revenue of more than US$60 billion and about 80,000 employees in 102 countries.

In Ireland Microsoft has built its largest data centre outside the United States with cutting-edge technology and an innovative approach to improve its energy efficiency as an integrated strategy towards environment sustainability.

#### ❖ Forecasting the future growth of data centres

The internet is developing at a tremendous pace as more businesses and people worldwide gain access to more online services including online office functionality, video and music downloads and more. Experts predict a continuous growth towards “cloud computing”, or software plus services providing companies with an opportunity to save money on IT infrastructure and software developers an advanced interoperable platform to create innovative software for the future. Data centre will also be used to host web conferencing tools like Microsoft’s Office Live Meeting that reduce the need for emission-causing business travel. To support this projected growth, the software industry is building more data centres. This represents a challenge as they consume a significant amount of energy. In the UK, data centres represent 3% of energy consumption and it is expected to double by 2020 if nothing changes. This means more CO2 and a huge electricity bill for ICT companies hosting data centres.

#### ❖ Complying with European energy efficiency standards and best practices

To tackle this challenge, Microsoft worked on a strategy to drastically improve data centres’ energy efficiency. It signed in May 2009 the EU Code of Conduct for Green Data Centres committing to comply with European standards and best practices. It then announced in July 2009 a data centre in Dublin, Ireland, that has a Power Use Effectiveness (PUE) of 1.25, on a scale where 1 is the optimal – the average in the industry is approx. 2.0 and Microsoft data centres globally have an average of 1.6.

#### ❖ Results: extensive innovations and savings

Microsoft has applied 100% of the Code best practices and will employ artificial cooling on very few days per year. This is possible thanks to different innovations, one of them being the use of outside air to cool the data centre at almost zero cost. This provides dramatic environmental savings as artificial cooling normally consumes approx. 38% of the facility incoming electricity and 18 million litres of water per month. In addition, the latest generation of servers and 24/7 monitoring will help further energy savings.

# Case Study N°14

## Microsoft and Fiat

### Reducing CO2 emissions by influencing drivers' behavior


Fiat is an Italian automobile manufacturer, engine manufacturer, financial and industrial group based in Turin, Italy. Fiat-based cars are constructed all around the world, and as of 2009, Fiat is the world's 6th largest carmaker as well as Italy's largest carmaker. Today the company works with almost 200,000 employees around the world and its global annual revenue is about US$87 billion. Since 1995, Microsoft's Automotive Business Unit has worked collaboratively with the auto industry to deliver technology designed for advanced in-car information, navigation and entertainment systems. In 2007, Fiat Group Automobiles and Microsoft Automotive Business Unit announced a new system that enables drivers to minimize their impact on the environment: EcoDrive.

#### ❖ Talking directly to the driver

EcoDrive is an innovative, easy-to-use application developed by Microsoft for Fiat cars that analyses a person's driving style and gives instructions on how to consume less fuel, reduce CO2 emissions and save money. Automakers have made tremendous progress in reducing auto emissions. Today's cars create far less pollution and emit far less carbon dioxide compared with those made a decade ago. Much of that progress is due to in-car computers that adjust fuel flow or air intake. But those computers talk only to other hardware components in the car. What if the car could talk to drivers and enlist their aid to reduce emissions? That is the idea behind EcoDrive, developed with Microsoft technology, it is the world's first device that interacts directly with drivers and can help them change their driving habits in ways that can reduce auto emissions. With EcoDrive, Fiat and Microsoft have developed a method to monitor motorist behaviour on the road and offer analysis and advice after a trip is completed.

#### ❖ Raising consumption awareness

EcoDrive is built on Blue&Me, a Bluetooth-based system developed jointly by Fiat and Microsoft that assesses the driver's driving style during a normal driving day. The way a driver accelerates, brakes, and shifts is automatically measured and analyzed against the car's fuel economy and exhaust emissions. At home, the driver removes a standard USB flash drive from a USB port on the dashboard or the glove compartment, plugs it into a computer and downloads information about his or her most recent driving excursion. A software application then tells the motorist how many pounds of emissions the car produced during the most recent drive and how the driver can reduce those emissions by driving in a more environmentally friendly way.

#### ❖ Outcome: significant emissions reductions through better driving habits

A typical Fiat—already among the most environmentally friendly cars in Europe—emits about 150 grams of CO2 per kilometre, or about 2 metric tons in a typical driving year. This makes an annual reduction of nearly 400 kilos of CO2 possible. Motorists also can reduce fuel consumption and save money. EcoDrive illustrates the potential of software technology to reduce auto emissions worldwide. In the U.S., for instance, automobiles account for about one-quarter of annual emissions of CO2, the gas primarily responsible for global warming. The reduction of emissions by 20 or even 10% through better driving habits would make a huge contribution to automakers' efforts to produce more environmentally friendly cars.

# Case Study N°15

## GDF SUEZ

### Better energy efficiency thanks to a long-term, large scale and mixed solution

2008 was marked by significant progress in social and environmental issues: In Europe the energy – climate package was adopted by the 27 Member States; in France, the Environmental Grenelle commitments started to be put into actions; in the United States, the Federal government has demonstrated a renewed interest in reducing greenhouse gas emissions. This year was also marked by the vast economic crisis which had a world-wide impact. It should have served to remind us that we urgently need to change our individual conduct and rethink the social model on which such conduct is based.

The importance of reconsidering our priorities must be added to the list of other challenges that we should have addressed some time ago, but for which we have simply been taking stock:

- Ensuring that populations have access to basic essential services such as energy, water and sanitation;
- Climate change with the now obvious consequences;
- The depletion of natural resources and the need to promote a circular economy;
- The security of supplies to regions and the reduction of energy dependence on third parties.

GDF SUEZ considers these challenges to be an opportunity to implement increasingly innovative solutions to contribute to more sustainable and responsible overall growth, since our ambition, which lies at the very heart of our industrial vision, has always been to become a benchmark for sustainable development.

The activities of GDF SUEZ, as a provider of public utility services to cities and companies around the world, lie at the heart of these challenges; it is duty bound to respond to the problems experienced by its clients on a daily basis. These constitute the mission and objectives of GDF SUEZ's business activities, which, by their very nature, will always be integral to a sustainable form of development, whether it involves supplying energy and energy efficiency services, environmental services, or water, sanitation and waste management services.

❖ **Improving the energy and environmental performance of Rome: An example from Cofely activities.**

Cofely, the energy and environmental efficiency services company of GDF SUEZ, designs, realizes, and operates long-term solutions that meet the energy needs of businesses and public authorities, improve the performance of their installations, and enhance their assets, while ensuring optimal service and reducing their environmental impact. With close to 35,000 employees active in more than 15 countries, Cofely generates revenues of around EUR 8 billion. Well-established in Italy, Cofely is simultaneously involved in three major jurisdictions: the city and province of Rome, and the region of Latium.

### ❖ A better energy efficiency thanks to a long-term, large scale and mixed solution

In 2008, Cofely won two new contracts from the city. The first was for 940 heating facilities for day-care centers, schools, retirement homes, offices and others. It followed an RFP where technical criteria were the most important factors in the decision. With the eternal city reflecting growing sensitivity for the environment, Cofely was able to orient its proposals toward renewable energy, which made all the difference. The installation of photovoltaic panels and a cogeneration plant will reduce CO2 emissions by 600 metric tons, and a savings of 260 tep.

The second contract covers the renewal of a management contract for 230 buildings. Cofely's contract was renewed thanks to an efficient solution combining the installation of gas-fuelled condensing boilers, integration of renewable energy (solar heating and photovoltaic panels), and the use of innovative remote control technologies. Also important was Cofely's demonstration in the previous contract to building occupants of high professional and relational qualities, in addition to the excellent performance of its facilities. Photovoltaic electricity is also programmed for the new contracts let by the Province in 2008. Since May 2007, Cofely leads a joint venture providing facilities management services for 12 buildings where solar panels were successfully installed to improve energy and environmental efficiency. That experience led the customer to carry it further. Now 63 buildings will be equipped with solar panels. On a yearly basis, a total of 75 sites avoid 323 metric tons of CO2 emissions, and spare 135 tep.

Finally, Cofely's technical expertise in renewable energy enabled it to win an RFP issued by the Region against six competing proposals. The contract calls for renovating 21 facilities and installing solar panels on the roof of the Region headquarters.

# Case Study N°16

## Vattenfall

### Nordjylland power station – the world's most efficient coal-fired Combined Heat and Power Plant

Vattenfall's vision is to be a leading European energy company; our main products are electricity and heat. We work in all parts of the electricity value chain: generation, transmission, distribution and sales, and generates, distributes and sells heat. Vattenfall also conducts energy trading and lignite mining. The Group has approximately 39,000 employees. The Parent Company, Vattenfall AB, is 100 per cent owned by the Swedish state.

We have operations in Sweden, Finland, Denmark, Germany, Poland, the Netherlands, Belgium and UK with a total of 7.4 million electricity customers and 5,6 million network customers.

Our strategic direction is clear, and can be summed up in three words: Making electricity clean. In a nutshell, these three words express Vattenfall's climate vision: to be a climate-neutral company by 2050.

#### ❖ Power plant efficiency

Energy efficiency is one of the most important environmental aspects for us at Vattenfall. Improved efficiency in power plants and distribution grids means that society's need for energy will be met while using fewer resources and causing less environmental impact per generated unit of energy.

We are continuously investing in modern technology, higher safety and better environmental performance in our power plants. We also replace old plants with new, modern and more efficient ones. These new power plants will have significantly better operating efficiency and environmental performance compared to older plants.

#### ❖ Nordjylland power station

The Nordjylland Power Station in Denmark, fired by coal, can produce 656 MW electricity and 542 MW heat. Cogeneration of electricity and district heat ensures optimum fuel utilization. The plant consists of two units, both run with a constant environmental focus.

As early as 1992, Unit 2 was awarded the international McGraw award for the world's first full-scale SNOX facility. One of the by-products from this type of treatment is almost 100 per cent pure sulfuric acid that is used in the fertilizing industry.

Unit 3 at the Nordjylland plant is the most effective coal-fired plant in the world, with 91 per cent efficiency when producing both electricity and heat. Unit 3 removes $NO_x$, fly ash and sulfur from the flue gas. The fly ash is utilized in the cement industry, and the sulfur is turned into gypsum that is used for industrial purposes thus reducing imports of natural gypsum.

Compared with older generating facilities, Unit 3 produces much more electricity and district heat on the same amount of fuel. And the more efficiently every kilo of coal is utilized, the less $CO_2$ is emitted, and the lower the production costs are. In that fashion, Nordjylland Power Station duly considers the environment, our heating and the electricity bills.

# Case Study N°17

## Association of German Chambers of Industry and Commerce (DIHK e.V.)

### The European Energy Manager (EUREM)

The European Energy Manager (EUREM) is an initiative of the EUREM.NET cooperation partners from twelve European countries, which promotes the use of a high-level standardised training course. The European Union supports this initiative in the framework of the Intelligent Energy-Europe programme.

#### ❖ Objectives

By adopting energy-efficient technologies and practices companies can realise considerable profits. Many of these pay back within a short period and increase the competitiveness of innovative companies. Additional benefits of adopting energy-efficient technologies are increase of quality, climate protection and reduced environmental damages. It is estimated that about a quarter of the energy use in industries could be saved in a cost-effective way.

Initiatives that provide staff responsible for energy issues with the know-how needed to reduce energy consumption in an economically sound fashion will be the more important the higher prices for energy rise. The aim of the European Energy Manager is not only identifying these potentials but also taking action to exploit them. This demonstrates the importance of energy managers for companies.

The goal of EUREM.NET was to implement the training programme for European Energy Managers (EUREM) in the majority of EU countries. The EUREM standardized training programme was implemented by nine other EU countries, which was developed in the years 2003-2005 by the Chamber of Commerce and Industry for Nuremberg and Central Franconia (CCI), the German-Portuguese Chamber of Commerce and Industry in Lisbon (DUAL) and the Austrian Economic Chamber (WKÖ).EUREM is now carried out regularly by twelve European countries as the standard qualification programme in the energy management area.

Four objectives were determined at the beginning by the EUREM.NET partners, in order to implement a standardized qualification for European Energy Managers (EUREM) throughout Europe:

1. EUREM courses running in twelve EU countries
2. Continued development of the EUREM training materials
3. National acceptance of EUREM European wide certificate
4. Formation of a network for European EnergyManagers

In order to become an European EnergyManagers one has to:

- attend the EUREM seminar modules
- successfully complete a written exam
- work out an energy concept to improve the energy performance of their company
- present the results of this energy concept to a jury
- exchange experiences with colleagues on a European wide internet platform

The **EUREM seminar modules** cover nearly all energy-relevant issues:

- Energy fundamentals, Energy data management, Load management
- Energy requirement of buildings/ energy efficient buildings
- Heating, Process heat, Steam, Heat recovery
- Air conditioning, Cooling, Cogeneration
- Light, Compressed air, Electrical drives
- Solar technology, Energy from biomass, Geothermal energy
- Energy purchase and trade, Energy laws, Emission trade, Contracting
- Project management, Economy calculation

The curricula of the EUREM courses include these energy issues and encompass a 240 hours course. At the end of the course, a 2-hour written examination is scheduled.

In order to transfer the skills of the seminar modules into practice, the EUREM participants develop an **energy concept** for their company. Each energy concept must contain a comprehensible basic analysis, the description of optimization potentials and the economic calculations for suggested solutions. In the process, the EUREM participant is supervised by a tutor from the team of trainers.

**Results: More efficient use of energy – as a consequence lower costs and $CO_2$-emissions**
The results with EUREM show that the energy efficiency has been optimized in the companies and remarkable energy-, cost-, and $CO_2$ – savings have been achieved in all twelve EU countries.

22 EUREM courses were carried out by the twelve EUREM.NET partners in the years 2007 and 2008, all using the same method and standardized training materials. A total of 346 representatives from various companies and public institutions have qualified as European Energy-Managers. The energy concept which each of the energy managers has to realize in his companies helps saving an average of 291 tons $CO_2$ per participant per annum.

More information: www.energymanager.eu

# The International Chamber of Commerce (ICC)

ICC is the world business organization, a representative body that speaks with authority on behalf of enterprises from all sectors in every part of the world.

The fundamental mission of ICC is to promote trade and investment across frontiers and help business corporations meet the challenges and opportunities of globalization. Its conviction that trade is a powerful force for peace and prosperity dates from the organization's origins early in the last century. The small group of far-sighted business leaders who founded ICC called themselves "the merchants of peace".

ICC has three main activities: rules-setting, dispute resolution and policy. Because its member companies and associations are themselves engaged in international business, ICC has unrivalled authority in making rules that govern the conduct of business across borders. Although these rules are voluntary, they are observed in countless thousands of transactions every day and have become part of the fabric of international trade.

ICC also provides essential services, foremost among them the ICC International Court of Arbitration, the world's leading arbitral institution. Another service is the World Chambers Federation, ICC's worldwide network of chambers of commerce, fostering interaction and exchange of chamber best practice.

Business leaders and experts drawn from the ICC membership establish the business stance on broad issues of trade and investment policy as well as on vital technical and sectoral subjects. These include financial services, information technologies, telecommunications, marketing ethics, the environment, transportation, competition law and intellectual property, among others.

ICC enjoys a close working relationship with the United Nations and other intergovernmental organizations, including the World Trade Organization and the G8.

ICC was founded in 1919. Today it groups hundreds of thousands of member companies and associations from over 120 countries. National committees work with their members to address the concerns of business in their countries and convey to their governments the business views formulated by ICC.

International Chamber of Commerce
*The world business organization*
**Policy and Business Practices**
38 Cours Albert 1er, 75008 Paris, France
Tel +33 (0)1 49 53 28 28 Fax +33 (0)1 49 53 28 59
E-mail icc@iccwbo.org Website www.iccwbo.org