

## Case Studies Energy Efficiency

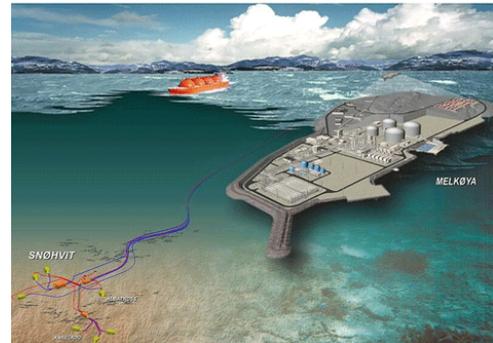
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1. [Statoil Hydro and ABB](#)  
Using Communication and Information Technologies to improve Energy Efficiency
2. [IBM](#)  
Raising awareness of energy consumption and opportunities
3. [The Mexico GHG Program](#)  
A Nationwide Voluntary Agreement
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 Snøhvit 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."

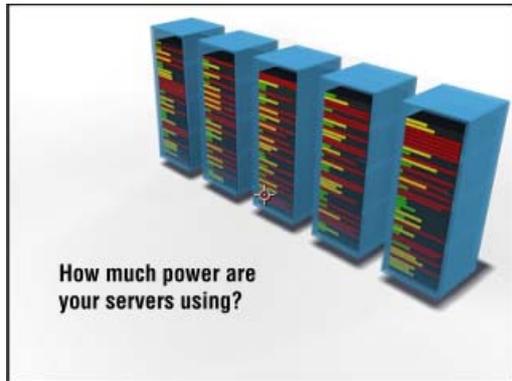
#### ❖ **Results: Significant Reductions in Energy Use and Lower Costs**

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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> emissions; and a more than 82 million yen reduction in the utility costs.

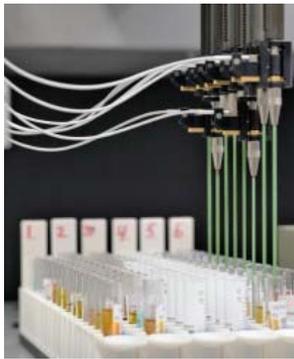
#### ❖ Government measures to support the ESCO industry

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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> 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 CO<sub>2</sub> 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 CO<sub>2</sub> 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<sub>x</sub>, 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<sub>2</sub> 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.