Investment Theme
Energy Efficiency

STRATEGIC CALL

Socially Responsible Investing

Asset Class: Equity

Investing in Sustainable Energies Part II

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At a glance

While Part I of our Investment Theme on Sustainable Energies looked at investment opportunities in renewable energy, Part II primarily focuses on the demand side of energy use: energy efficiency. In this part, we identify the drivers for energy efficiency in five key areas and look at companies set to profit from these drivers.

Energy Efficiency – the best "alternative fuel"

- Energy efficiency is a cost-efficient way to achieve significant reductions in CO_2 emissions.

Most important driver: Tighter legislation

- High energy prices support energy efficiency. But the main driver is tighter policies on climate change and energy supply security, which would help to remove obstacles, such as agency issues, lack of information and policy distortions, to further energy efficiency gains.

Investment opportunities in key areas

Energy efficiency is becoming an important business driver for many companies. We expect companies offering innovative products and services in the following areas to benefit from strengthening energy efficiency legislation.

- *Building*: insulation materials; energy management; efficient heating, ventilation, air conditioning and water heating; intelligent metering; energy efficient lighting, household appliances and electronic goods
- *Transport*: lightweight materials, clean diesel, alternative propulsion systems, energy efficient tires
- *Electricity production and transmission*: efficient turbines, clean coal generation technologies, combined heat and power generation, low-resistance electricity transmission, advanced metering infrastructure, demand-side management
- *Industrial processes*: energy efficient motors and steam systems, disruptive technologies (e.g., biotechnology)
- *IT and power electronics*: virtualization technology, power management

Long-term investment horizon

- Drivers in a few areas might take several years to materialize. The investment horizon for this theme is at least 3-5 years.

High exposure to economic cycle

Most of the companies exposed to energy efficiency opportunities operate in industries that are highly exposed to the economic cycle. The prevailing economic uncertainty may overshadow some of these long-term drivers in the shorter term.

What is a Strategic Call?
A Strategic Call seeks to exploit investment opportunities among a wide range of asset classes. The calls are based on long-term trends and themes, and have a corresponding investment horizon and holding period assumption of greater than 12 months. Consequently, the views expressed in a Strategic Call can at times diverge from our shorter-term tactical recommendations.

Recommendations: at a glance

Name	Industry	Country
Johnson Controls	Auto Components	US
BorgWarner	Auto Components	US
Michelin	Auto Components	FR
ABB	Electrical Equipment	CH
Siemens	Industrial Conglomerates	DE
Intel	Semiconductors	US
Texas Instruments	Semiconductors	US
Cypress Semiconductors	Semiconductors	US

Source: UBS WMR, as of 23 June 2008

Selections may change over time, we advise to always check on our individual stock ratings

Energy Efficiency – the best "alternative fuel"

Part I of this Investment Theme looked at possibilities available on the energy supply-side to reduce dependence on fossil fuels and diminish CO_2 emissions. However, it is clear that significant reduction in CO_2 emissions, which is necessary to contain global warming, cannot be achieved by only increasing the use of renewables (renewable sources of energy) or nuclear energy. It is obvious that the energy demand-side needs to be tackled as well. Apart from behavioral changes and end-of-pipe solutions, such as carbon capture and storage (CCS), the main source of energy savings and CO_2 reductions is energy efficiency. The International Energy Agency's (IEA) "Alternative Policy Scenario" (see Fig. 1) attributes about two-thirds of total energy savings and avoided CO_2 emissions to energy efficiency.

In fact, energy efficiency is often referred to as the best "alternative fuel". A study carried out by McKinsey (2007) evaluated the aggregated global CO_2 abatement potential of measures costing less than EUR 40 per ton of saved CO_2. As can be seen in Figure 2, saving one ton of CO_2 emissions through energy efficiency, for example, in building insulation, can actually lead to savings of more than EUR 150 over the life cycle, whereas saving one ton of CO_2 emissions through renewables still costs money (in the case of wind, for example, EUR 20). The International Energy Agency estimates that, on average, an additional dollar spent on more efficient electrical equipment, appliances, and buildings reduces more than two dollars in investment in electricity supply.

Most important driver: Tightening regulation

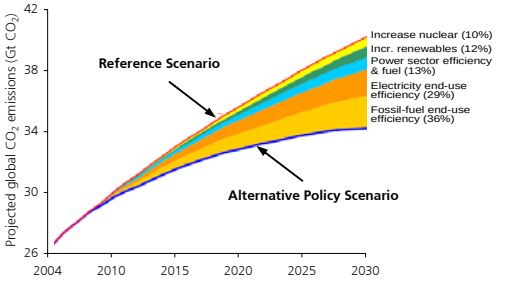
Considering that energy efficiency makes so much sense, the question arises is it already being pursued? Indeed, improvement of energy efficiency has always been an integral part of technological progress and improvement of operational efficiency. However, the rate of energy efficiency improvements since 1990 has been half of that in previous decades (see Fig. 3). Between 1990 and 2004, incremental annual energy efficiency gains were only around 1%. In order to achieve significant reduction in absolute energy use, however, energy efficiency gains must more than compensate, e.g., increases in traffic volumes or increases in floor space used per person. Based on "business as usual" (Reference Scenario), the IEA projects the world's primary energy needs to grow at an average annual rate of 1.8%. Therefore, if energy efficiency is to make a significant contribution to CO_2 reduction strategies, the annual improvements must be significantly higher than this growth rate.

There are several obstacles to increased energy efficiency; the important ones being agency issues and a combination of lack of information and incentive at the consumer level (see Fig. 4). However, as improving energy efficiency offers so many low-hanging fruit compared to other CO_2 reduction strategies, there is a good reason to assume that climate change policies will increasingly focus on removing these obstacles, mainly the agency and information problems. In fact, evidence of this development is emerging in several regions as illustrated by the following examples.

- The **EU** targets a 20% reduction of greenhouse gases (GHG) compared to 1990 levels and a concurrent 20% improvement of energy efficiency by 2020. Based on this target, an *Action Plan for Energy Efficiency* was developed, which targets, e.g., more efficient transportation systems, improved energy performance of existing buildings and products (e.g., boilers, water heating, television, air conditioners or washing machines), and improved efficiency of heat and electricity generation, transmission and distribution.

Fig. 1: IEA Alternative Policy Scenario

Improved end-use efficiency accounts for two thirds of avoided emissions in 2030 in the alternative policy scenario



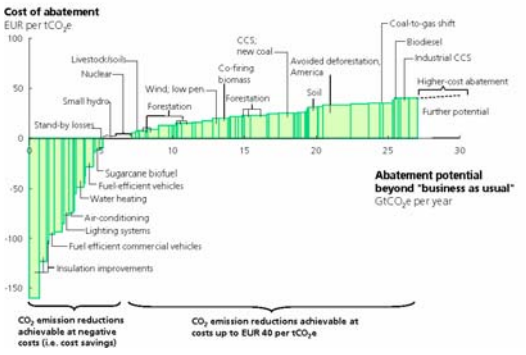
The IEA's **Reference Scenario** takes into account of government policies and measures that have been enacted or adopted as of date and presents a baseline vision of how energy markets would evolve if governments do nothing beyond what they have already committed to.

The IEA's **Alternative Policy Scenario (APS)** analyses the impact of a range of policies and measures that countries in all regions are considering adopting or might reasonably be expected to adopt at some point over the projection period. Note that the APS leads to a reduced growth rate but not to an absolute reduction in CO_2 emissions.

Source: OECD/IEA, 2006, World Energy Outlook

Fig. 2: McKinsey global cost curve for green house gas abatement – year 2030

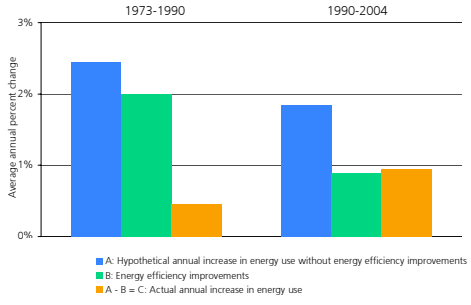
Energy efficiency offers some of the cheapest options for reducing CO_2 emissions



Source: McKinsey Climate Change Special Initiative 2007

Fig. 3: Energy efficiency development

Energy efficiency improvements dropped significantly in IEA-11 countries (AU, DK, FI, FR, DE, JP, IT, NO, SE, UK, US)



Source: OECD/IEA, 2007

- The **US President** announced, in his 2007 State of the Union Address, a nationwide goal to reduce US oil consumption by 20% from the current projected levels by 2017. The goal includes specific measures such as raising the fuel economy standards and a number of energy efficiency provisions in the area of energy efficient appliances, federal building energy efficiency, or incentives for the use of mass transit. Though progress at the national level regarding climate change issues may appear slow in the US, it should be borne in mind that policies and initiatives at the state (e.g., California) or city level are often far more advanced.
- The **Chinese government's** 11th five-year plan aims to cut energy use per unit of GDP by 20% by 2010. Apart from specifying the share of each major fuel in the primary mix, the plan also sets efficiency targets for power generation and industrial processes. In the past, China has proven that it can decouple GDP growth from energy demand. As a result of President Deng Xiaoping's reforms, energy demand grew less than half as fast as GDP between 1979 and 2000. But, relatively, energy demand started soaring since the late 1990s, and from 2001, it exceeded GDP growth rate. The potential for energy efficiency in China is enormous: currently, China uses five times more energy per unit of GDP than Japan (see Fig. 5).

Whereas climate change may be the main driver in Europe, security of energy supply clearly constitutes a further and important motivation for formulating energy efficiency policies in many parts of the world. Whereas this may be geopolitically motivated in the US, energy efficiency in Asian countries (e.g. China) is simply becoming a key prerequisite in order to sustain the current economic growth momentum.

Based on the drivers just described, we believe that energy efficiency offers good investment opportunities. In the following pages, we will take a closer look at opportunities in five key areas: building, transport, electricity production and transmission, industrial processes, and IT & power electronics. There is no clear demarcation among these areas and there are obvious overlaps. Solutions discussed in one area might be applicable to other areas as well.

Building

Buildings account for approximately 40% of energy use in OECD (Organization for Economic Cooperation and Development) countries and offer the single largest potential for energy efficiency and reduction of greenhouse gas emissions (see also Fig. 6). As buildings usually have a long life, today's construction decisions will influence a large share of the world's energy use for several decades. For example, the rapid growth of urban residential living space in China (see Fig. 7) demonstrates the urgency to set the course for higher energy efficiency in buildings now. Urban residential living space increased by 50% from 2000 to 2005. Compliance rates with building standards in new buildings in China range from 60% in the northern region to only 8% in the south. Apart from the increasing living space, the steady increase in appliance ownership strongly contributes to soaring energy use.

Improvements in the building area could be done at a lower cost compared to other CO_2 abatement options. In fact, most of the options identified in the McKinsey study that offer lifecycle savings can be attributed to buildings (see Fig. 2).

If the potential for CO_2 reductions and cost savings is so large in buildings – why hasn't it already been exploited a long time ago? This is because buildings are a typical example of the earlier mentioned agency problem with misaligned incentives (see Fig. 4). Several parties can be involved in the building value chain, all with very different motivations, priorities and information. According to a survey carried out by Lippin-

Fig. 4: Barriers to energy efficiency improvements

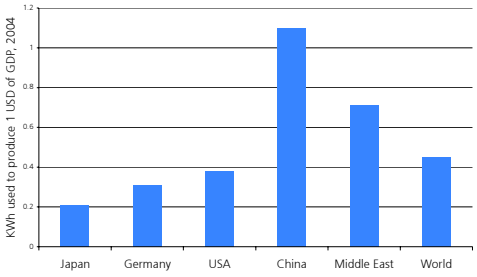
Market imperfections and policy distortions seen today act as barriers to further energy efficiency improvements

Agency issues	Two parties engaged in a contract can have different goals and levels of information → misaligned incentives Example of landlord/tenant, or producer/consumer of electrical appliances: Party which is in a position to decide about energy efficiency improvements is not the one paying the energy bill
Lack of information	Energy savings potential is not always that obvious as it often comes in many small pieces and not big chunks. Consumers are often unaware of the savings potential.
Lack of incentive	Large impact of energy efficiency only at aggregated level (e.g. electricity savings through energy efficient refrigerators), but little incentives on consumer level (even if it pays off), as energy cost is simply too low relative to other factors.
Policy distortions	External costs (e.g. of climate change, acid rain) are not fully included in the price of fossil fuels Fossil fuel subsidies (e.g. fuel subsidies for transport in Middle East, cheap natural gas for households in Russia).
The psychological angle	Higher energy consumption as a sign of prosperity, efficiency improvement associated with rationing, loss of comfort and therefore a priori dismissed. This argument is particularly applicable in the case of developing and emerging countries.

Source UBS WMR, as of June 2008

Fig. 5: Comparison of energy intensity

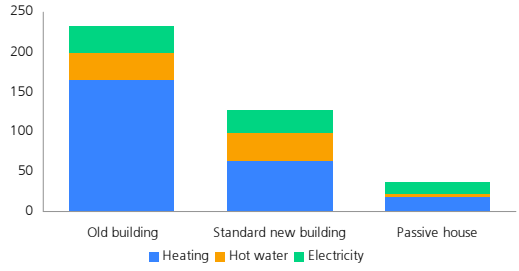
China uses five times more energy per unit of GDP than Japan



Source: OECD/IEA, 2007

Fig. 6: Building energy use

An old building uses five times more energy than a new passive house (kWh per square meter and year)



Source: Energy Conservation in Buildings and Community Systems (EBCS), 2006

cott Mercer (2007), building professionals clearly overestimate the cost premium for a sustainable building. Their estimate of 15-20% is far higher than the actual premium, which is likely to be around 5% and seldom higher than 10% in developed countries.

However, the good news is that there are policy developments throughout the world aimed at reducing these market failures with respect to energy efficiency (see Fig. 8). The EU's newly implemented Directive on the Energy Performance of Buildings (EPB) is probably the most effective regulatory change with a direct impact on building standards.

Investment opportunities

In saturated construction markets, like most of Europe and the US, energy efficiency legislation has become an important business driver, particularly in the renovation market (e.g., for insulation companies). High energy prices in the last few years have of course supported this development. Globally, the largest growth driver is construction activity, which is highest in developing and emerging countries.

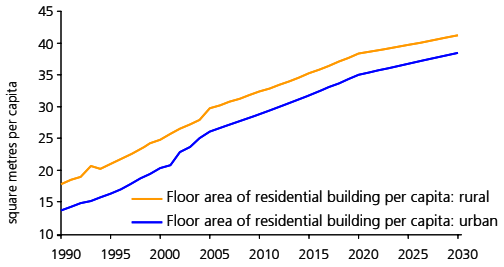
Large improvements in energy efficiency can be achieved through appropriate orientation of the building and by making optimal use of sunlight/daylight and shade, thereby greatly reducing the need for space heating and cooling. Such principles are of course easier and cheaper to implement in new buildings rather than through renovation. Overall, in our view, the choice of core building material is hardly going to change significantly; however, we expect the demand for thermally efficient versions of each material to increase. When it comes to installations and appliances, we expect a shortening of the replacement cycle. Companies with energy-efficient products and services in the following areas should profit from the policy changes in terms of higher demand as well as lower compliance costs.

- ***Insulation***: One of the most cost-efficient options to reduce CO_2 emissions overall (in cold as well as hot climates). All insulation types should benefit from this, but in saturated markets, we expect higher growth in premium products.
- ***Energy management and efficient HVAC***: Energy management including intelligent metering and efficient HVAC (heating, ventilation, air conditioning) and water heating systems.
- ***Lighting***: Energy-saving technologies such as compact fluorescent light bulbs, light emitting diodes (LED) or fiber optics (short replacement cycle in lighting compared to changes in building envelope).
- ***Household appliances and electronic goods***: Appliances with high energy efficiency rating such as EU Class A or B energy label or US EPA Energy Star label (shorter replacement cycle).

Figure 9 gives an overview of companies with exposure to energy efficiency in buildings. This is not a recommendation list, and the list is by no means exhaustive.

Fig. 7: Residential floor area in China

Constant increase in residential floor area per capita



Source: OECD/IEA, 2007, World Energy Outlook

Fig. 8 Policy/regulation developments regarding buildings and appliances

Region	Important developments
Europe	EU Directive on the Energy Performance of Buildings (EPB, 2006): requires energy pass which will increase transparency on energy use by tenants.
	Specific measures announced (2007) in several European countries (e.g. France: goal to double the number of buildings renovated each year).
	Eco-design Directives (adopted 2008): include labelling requirements and minimum energy performance standards for appliances and other energy-using equipment (starting with 15 priority product groups)
	EU plans to ban the sale of ordinary incandescent light bulbs by the end of the decade.
US	US 2005 Energy Policy Act: incentives e.g. credits for high-efficiency air conditioners or insulation and sealing.
	Energy Independence and Security Act (2007): reduction of light bulb energy use: 25-30% by 2012-2014; 70% by 2020.
Asia	"Comprehensive Action Plan for Energy Saving and Emissions Reduction" by Chinese NDRC (June 2007): better enforcement of building codes, energy conservation level of residential and public buildings targeted to be close to or reach modern medium developed countries level by 2020.

Source: UBS WMR, as of June 2008

Fig. 9 Building – Investment areas

Area	Company	Country	WMR Rating
Thermal insulation — producers of insulation, high-performance windows and window frames	Saint Gobain	FR	n.a.
	Kingspan	IE	n.a.
	Rockwool	DK	n.a.
	Owens Corning	US	n.a.
	SIG plc	UK	n.a.
	Uralita	ES	n.a.
Efficient energy management and HVAC	Johnson Controls	US	OP
	Siemens	DE	MP
	Schneider Electric	FR	n.a.
	Centrotec	DE	n.a.
	Zehnder	CH	n.a.
	Schulthess	CH	n.a.
	Itron	US	n.a.
	Echelon	US	n.a.
Lighting — producers of LED	Philips	NL	n.a.
	Siemens (Osram)	DE	MP
	Epistar	TW	n.a.
	Cree	US	n.a.
	Zumtobel	AT	n.a.
Household appliances and Electronic goods	Schulthess	CH	n.a.
	Rational	DE	n.a.

Source: UBS WMR, as of 23 June 2008

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Transport

Currently, transportation alone accounts for slightly more than 20% of global CO_2 emissions. What is more worrying is the predicted rapid increase in transport emissions, mainly in non-OECD countries, where car ownership and freight transport are expected to grow rapidly (see Fig. 10 for IEA's estimates on China and India).

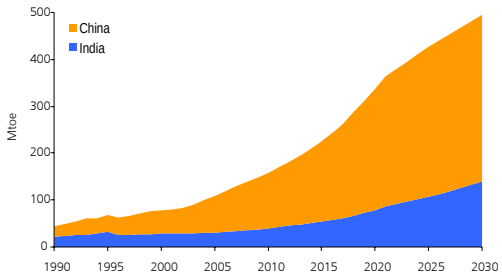
Due to the relatively short replacement cycle compared to buildings, energy efficiency gains in transport (particularly cars) can yield quicker results in controlling CO_2 emissions. It is clear that significant reduction in transport CO_2 emissions is hardly possible without corresponding changes in user behavior and optimization of the whole transport system (e.g., through a more efficient combination of individual and mass transportation). As of date, these options are not yielding the desired results. For example, consumer demand is still not seen as a large driver for fuel efficiency, unless supported by fiscal measures and even higher energy prices.

As per the IEA, the predicted annual growth in transportation demand is around 2%; hence, efficiency improvement would have to be higher than this rate in order to compensate and achieve absolute reductions in CO_2 emissions. In the past, this has not been the case. However, currently, there are several policy developments that should lead to intensified energy efficiency efforts in transportation in the future (see Fig. 11). The EU is putting the car industry under pressure by moving from voluntary to mandatory targets on CO_2 emissions, and hence, the fuel consumption, for new vehicles sold (see Fig. 12). These targets are tied to a scheme of fines in case of non-compliance. The European Federation for Transport and Environment (T&E) expects EU's action to make cars more fuel efficient to have a big impact on the development of the global car market and future global oil consumption, as almost all of Asia follows European air pollution laws ('Euro standards') for cars. Also, the US is tightening its fuel efficiency requirements, albeit far less stringent than the European ones (see Fig. 13). Car manufacturer's margins are expected to be squeezed due to the higher technology and compliance costs.

Pressure is also increasing on air travel, as the European Commission has proposed the inclusion of airlines into the European Emission Trading scheme. This means that airlines flying to and from Europe will be subject to an increased cost burden. As a result, low cost airlines may be hit harder, as the additional costs will represent a higher portion of both total costs and revenues. Due to the current high oil prices, aircraft manufacturers are already strongly focusing on fuel efficiency: according to its manufacturer, the Boeing 787 uses 20% less fuel per passenger than similarly sized airplanes.

Fig. 10: Road transport fuel consumption in China and India

The IEA projects soaring transport fuel consumption by China and India in its Reference Scenario



Source: OECD/IEA, 2007, World Energy Outlook

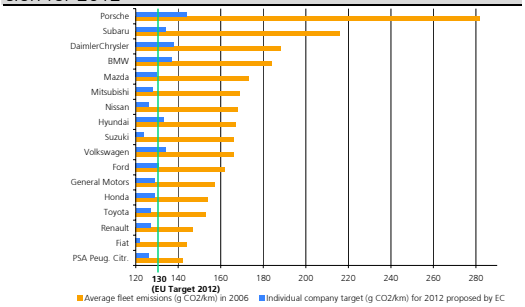
Fig. 11: Policy/regulation developments in transportation

Region	Important developments
Europe	European Commission objective to reduce average emissions from new vehicles sold in the EU to 120g CO_2/km by 2012 (corresponds to 4.5 liter diesel/100 km diesel and 5 liter petrol/100 km). Car manufacturers are expected to achieve a reduction to 130g CO_2/km, while additional measures such as increased use of biofuels or tire efficiency should deliver a further reduction of 10g CO_2/km.
	European Commission announced tighter norms regarding maximum rolling resistance limits and labeling for road vehicle tires
	Fiscal measures announced in several countries such as "bonus-malus system" for cars (rebates on fuel efficient cars and purchase taxes on gas guzzlers) e.g. in France or Spain.
	Congestion charge schemes (e.g. in London) with charges based on fuel consumption of the cars.
	Proposal of European Commission to include airlines into European Emission Trading scheme from 2011/2012.
US	Energy Independence and Security Act (2007): Adjustment of Corporate Average Fuel Economy (CAFE) standard to 35 miles per gallon by 2020 for new cars and trucks (35 mpg = 6.7 liters /100 km). Previously: 27.5 mpg for cars and 22.7 mpg for light trucks.
Asia	Japan poised to introduce new fuel efficiency rules that imply a 20% cut from 2005 levels by 2015.

Source: UBS WMR, as of June 2008

Fig. 12: Vehicle fleet emissions in EU vs. target

CO_2 emissions of new vehicles sold in the EU are still far from the voluntary 140g/km target set for 2008 and the mandatory 130 g/km target set by the European Commission for 2012



Source: European Federation for Transport and Environment (T&E), Nov. 2007

Investment opportunities

Overall, it appears that component suppliers will be more exposed to opportunities, whereas the car and aircraft manufacturers as well as the airlines should be more exposed to the risks regarding energy efficiency. We expect companies offering solutions in the following areas to benefit from tighter energy efficiency legislation in transportation.

- ***Lightweighting***: As the energy required in moving an object is directly related to its weight, reduction of weight is a key strategy in transport energy efficiency. We see opportunities for aircraft and auto suppliers with lightweight solutions (e.g., lighter interior design, smaller and lighter engines, lighter components made from aluminium, titanium, or carbon fiber) and chemicals companies active in carbon fiber production.

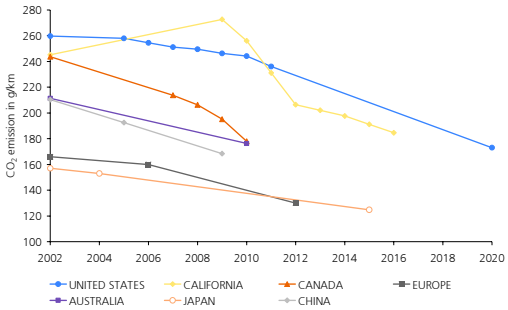
- ***Technological improvements in engine technology and propulsion system and transmission***: Hybrids (vehicles combining a conventional propulsion system with an on-board rechargeable energy storage system (RESS) to achieve better fuel economy) are gaining market share, and fuel cells may appear as the ultimate solution – though it is not clear yet which technology will emerge as the best to reduce CO_2 emissions. However, it is clear that there is still large efficiency improvement potential for the "traditional" internal combustion engines, e.g., through petrol direct injection, downsizing of engines, turbo technology, variable valve timing, or the switch from petrol to diesel. We expect suppliers offering innovative solutions in any of the above-mentioned technologies to benefit from increased business opportunities. In addition, emission controls companies that make diesel "cleaner" are expected to benefit, as are companies involved in manufacturing catalysts and particle filters.

- ***Reduce rolling resistance of tires***: The role of tires in fuel efficiency is often underestimated. Roughly 20% of the fuel consumed in a car is used in overcoming the rolling resistance of tires. The current technology's better tires and optimal tire pressure can already improve vehicle fuel efficiency by more than 5%. Industry sees a reduction potential of rolling resistance of up to 50% in the future, which would imply an improvement of overall fuel efficiency of 10%. We see increased opportunities for manufacturers with a high share of low rolling resistance tires.

Figure 14 gives an overview of companies with exposure to energy efficiency in transport. This is not a recommendation list, and the list is by no means exhaustive.

Fig. 13: Worldwide CO_2 standards

Actual and projected CO_2 emissions for new passenger vehicles by country, 2002-2020



Values normalized to New European Driving Cycle (NEDC) in grams of CO_2-equivalent per km

For Canada, the program includes in-use vehicles. The resulting uncertainty on new vehicle fuel economy was not quantified.

Source: International Council on Clean Transportation (ICCT), 2007, updated 2008

Fig. 14: Transport – Investment areas

Area	Company	Country	WMR Rating
Lightweighting	Gurit	CH	n.a.
	Toray	JP	n.a.
Improving conventional motors and drive trains	BorgWarner	US	OP
	Continental	DE	n.a.
	Denso	JP	n.a.
	Johnson Matthey	UK	n.a.
	Umicore	BE	n.a.
	Beru	DE	n.a.
Hybrids, fuel cells, electric cars	Johnson Controls	US	OP
	Johnson Matthey	UK	n.a.
	Umicore	BE	n.a.
Low rolling resistance	Michelin	FR	OP

Source: UBS WMR, as of 23 June 2008

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Electricity production and transmission

Assuming "business as usual", the IEA projects global electricity demand to double by 2030, growing faster than the overall energy demand (see Fig. 15). Coal will clearly remain the most widely used fuel (see Fig. 16). According to the IEA, in 2006, nearly 90% of new power generation capacity in China was coal-fired, compared to 70% in 2000. Hence, even if climate change policies may drive a stronger growth in renewables and low-carbon fuels, there is still considerable CO_2 reduction potential through improving generation and transmission efficiency of coal-fired power plants.

The regulatory structure in most regions of the world has historically rewarded utilities for building infrastructure and selling energy, while energy efficiency was low priority, even when energy-saving measures cost less than constructing new infrastructure. However, market liberalization as well as climate change policy developments are now beginning to take a front seat.(see Fig. 17). The most important legislative change affecting utilities in Europe is the launch of the European Emission Trading Scheme (EU ETS) in 2005. Phase I allowed most European utilities to generate windfall profits without substantially reducing their GHG emissions. However, Phase II, which started in 2008, will require emitters to gear up efforts, and Phase III, starting in 2012, is likely to be even more stringent. The EU is also promoting decentralized small-scale generation with combined heat and power. Meanwhile, energy efficiency efforts in the US, particularly in transmission, are more driven by the need to reduce the probability of power outages. While in China, where more than 80% of electricity is produced using coal, the main reason behind closing down old inefficient plants is to reduce pollution in general.

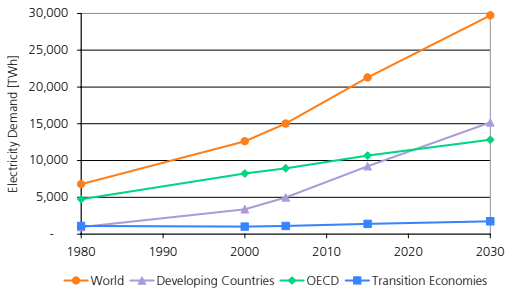
Investment Opportunities

Energy efficiency gains can be achieved along the supply chain. Overall, we see the main beneficiaries of energy efficiency efforts as being the suppliers of electricity generation and transmission infrastructure and not the utilities themselves.

- ***Improved generation efficiency:*** Average transformation efficiency for coal and oil-based electricity generation is 30-35%; new generation capacity can achieve efficiency close to 60% in the case of high-efficiency natural gas power plants (see Fig. 18). As still over 40% of electrical power worldwide is expected to be produced using coal in the next few decades, it is essential to improve efficiency of coal-fired power plants, as it can lead to larger reductions in CO_2 emissions (see Fig. 19), in absolute terms. Electrical companies have been working on developing cleaner coal generation technologies, such as supercritical and ultra-supercritical or integrated gasification combined cycle (IGCC). Large efficiency improvements can also be achieved by increasing steam temperature of conventional steam-cycle coal and lignite plants. Further, whichever fuel is used, a lot of energy is lost if the heat produced is not used. With cogeneration, also called combined heat and power (CHP), both the electricity and heat produced is used together, thus reducing energy wastage and CO_2 emissions. CHP installations can achieve energy efficiency levels of up to 90%. CHP systems are ideally installed close to users, thereby reducing power transmission losses. Overall, companies offering more efficient turbines or high efficiency transformers as well CHP are expected to benefit from efforts towards higher energy efficiency. Metering companies should also benefit, especially in the context of CHP.

Fig. 15: Projected electricity demand

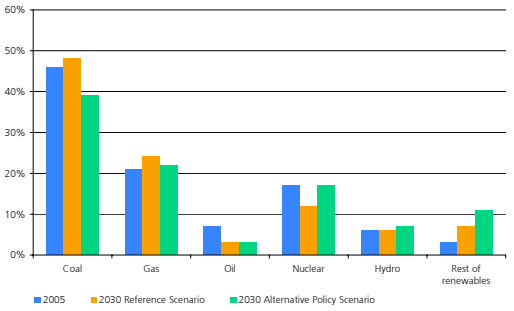
Electricity demand is projected to double by 2030



Source: OECD/IEA, 2007, World Energy Outlook

Fig. 16: Fuel mix in world power generation in 2005 and projections for 2030

Coal is likely to remain the fuel of choice



Source: OECD/IEA, 2007, World Energy Outlook

Fig. 17: Policy/regulation developments in electricity production and transmission

Region	Important developments
Europe	EU Emission Trading Scheme (EU ETS): Phase II started in January 2008.
	European Commission (by 2008): minimum binding efficiency requirements for new, smaller-scale energy production units (smaller than 20 MW).
	EU Directive on the Promotion of Cogeneration
	EU Directive on Energy End-Use Efficiency and Energy Services
US	US Electric Reliability Organisation to set enhanced national standards for transmission and distribution networks in 2007.
	US Department of Energy to designate National Interest Electric Transmission Corridors in 2007.
Asia	China: New pollution regulations for power generation on reduction of SO emissions by 23% by 2010 - effect will be positive for CO emissions.
	China: Target to optimise mix of thermal power generation by phasing out of small-scale backward units. Target to reduce unit coal consumption of coal-fired generation by 10g/kWh (3%) per annum.

Source: UBS WMR, as of June 2008

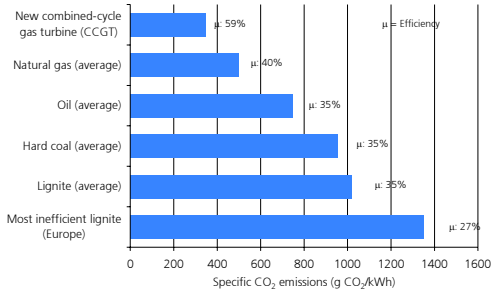
- ***Improved transmission efficiency.*** Transmission and distribution (T&D) losses are typically between 6% and 8% and sometimes can be as high as 10%. Companies with leading solutions in low-resistance transmission, such as high voltage direct current, gas insulated transmission lines, superconductors, and the reduction of transformer losses, are expected to benefit. Improvements in transmission efficiency often have to be seen in the context of the need to make electricity grids more "intelligent" or "smart" in general, providing reliable service to customers and optimizing the use of geographically distributed and diverse energy resources. In the US, for example, under-investment in network expansion and modernization in the past decades has led to a T&D infrastructure which is very prone to transmission congestion and subsequent power outages, leading to massive economic costs. The increased urgency to improve old electricity networks – not only in the US – opens up opportunities for companies offering solutions in the area of "intelligent grids".

- ***Improved end-use energy efficiency.*** Utilities can help their customers to reduce their energy use. AMI (advanced metering infrastructure) and demand response are the key words here. Demand response is the concept of end-use customers changing their electric energy usage in response to changes in electricity rates or incentives provided by utility companies. AMI are systems capable of collecting detailed and frequent energy usage data, which enables utilities to support time-based pricing programs for their customers, as well as to achieve other benefits relating to energy delivery and customer empowerment via informed energy usage choices. Advanced metering is also a prerequisite for demand response, which is not a new concept but has now gained popularity as a result of several power outages with devastating effects on economic activity. The goal for utility companies is to lower system-wide demand during peak times through controlled loads rather than building additional power generation infrastructure. Normally, customers participating in a demand response program earn revenue for agreeing to reduce electricity consumption when the utility calls for a demand response event. Companies offering metering and demand response products and services are expected to enjoy increased demand. They also play an important role in the development of the "intelligent grids".

Figure 20 gives an overview of companies with exposure to energy efficiency in electricity production and transmission. This is not a recommendation list, and the list is by no means exhaustive.

Fig. 18: Specific CO_2 emissions of different power plants in Europe

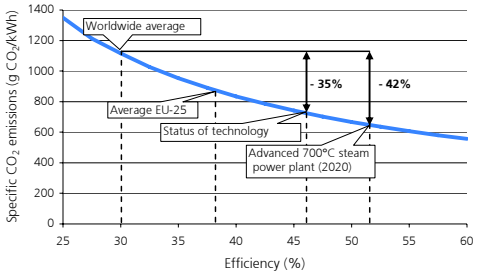
An average coal-fired plant emits twice as much CO_2 per produced electricity as a natural gas-fired plant



Source: European Bank for Reconstruction and Development (EBRD) /UBS Investment Bank

Fig. 19: Specific CO_2 emissions of hard coal-fired power plants

There is still large potential for improving efficiency of coal-fired power plants



Source: Eurelectric, Alstom

Fig. 20: Electricity Production – Investment areas

Area	Company	Country	WMR Rating
Efficient generation	ABB	CH	OP
	Siemens	DE	MP
	Alstom	FR	n.a.
	Gurit	CH	n.a.
	Von Roll	CH	n.a.
Efficient transmission	ABB	CH	OP
	Siemens	DE	MP
	Schneider Electric	FR	n.a.
End-use efficiency	Echelon	US	n.a.
	Itron	US	n.a.
	Comverge	US	n.a.
	EnerNoc	US	n.a.

Source: UBS WMR, as of 23 June 2008

As our ratings may change over time, we advise to always check on our individual stock ratings.

Industrial Processes

While the industries in OECD countries have done a lot in the past two decades to improve energy efficiency, there is still scope for further improvement. In its Action Plan for Energy Efficiency, the European Commission estimates the overall potential of energy-use reduction for the manufacturing industry to be around 25% by 2020, wherein peripheral equipment such as motors, fans and lighting offer the most significant savings potential. Even larger improvement potential exists in emerging countries.

For energy-intensive industries such as steel, cement, pulp and paper, or industrial gases, reduction in operational costs is a main driver for improving energy efficiency. However, energy conservation has not been a priority, especially, in countries with heavy subsidises on fossil fuels. Most of Chinese cement, for instance, is still produced using small shaft kilns, which are highly inefficient. Considering that China's cement production has sharply increased in the last few years, accounting for nearly 50% of the world's cement production, changes here can make a big difference. The same is true for steel production in China, which has also more than quintupled since 1990 (see Fig. 21).

Energy efficiency improvements in industry have so far mostly been achieved through voluntary commitments. However, as large point sources, such as industrial facilities, are easy targets for climate change policies, they were also included in the European Emission Trading Scheme. Similar schemes in other regions of the world (e.g., the US) are under discussion (see Fig. 22).

Investment Opportunities

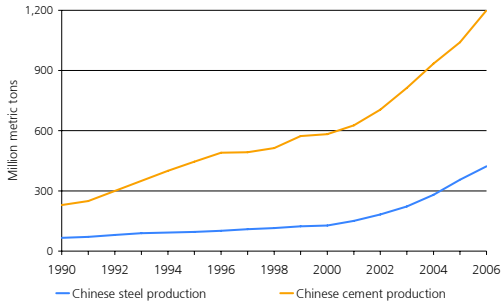
- ***Improving current processes***: Industrial companies who offer energy efficient machinery or components, such as pumps, motors or automation systems, are expected to benefit due to stronger pressure to improve energy efficiency. For example, more than 65% of industrial electrical energy is used by motors, and less than 12% of the motors used worldwide are equipped with variable speed drives which could reduce energy consumption considerably up to 30%. As these variable speed drives across the range have become smaller and cheaper over the past few years, it is becoming increasingly attractive to install them in smaller motors as well.

- ***Replace processes***: Energy efficiency can be significantly increased by replacing obsolete technology, especially in emerging markets. Sometimes, the solution lies in having a completely different approach to doing things. Hence, there are huge opportunities for companies using the so-called "disruptive technologies". Industrial biotechnology is once such example that can replace traditional chemical product processes with a more energy-efficient and less wasteful process. Not only can biotechnological processes be operated with less energy, the products of biotechnological production themselves can often contribute to energy savings in other processes, e.g., enzymes.

Figure 23 gives an overview of companies with exposure to energy efficiency in industrial processes. This is not a recommendation list, and the list is by no means exhaustive.

Fig. 21: Chinese cement and steel production

Both Chinese cement as well as steel production have more than quintupled since 1990



Sources: U.S. Geological Survey, Mineral Commodity Summaries; International Iron and Steel Institute

Fig. 22: Policy/regulation developments in in dustrial processes

Region	Important developments
Europe	The EU Emission Trading Scheme (ETS) includes industries such as steel or cement.
	EU Ecodesign Directive – indirect influence on processes.
US	No strong regulatory developments at federal level, but several high-profile programs, partly in co-operation with Department of Energy and Environmental Protection Agency, e.g., Industries of the Future, Climate Vision, Energy Star for Industry, Save Energy Now
Asia	China's medium and long term plan for Energy Conservation: includes measures in industrial manufacturing (particular focus on steel, building materials, chemicals, non-ferrous metals). Important priority: Upgrading of low-efficiency coal-fired industrial boilers.
	China's target to stabilise emissions of nitrous oxide from industrial processes to 2005 levels – will also affect efficiency and CO_2 emissions.

Source: UBS WMR, as of June 2008

Fig. 23: Industrial Processes – Investment areas

Area	Company	Country	WMR Rating
Efficient automation	Schneider Electric	FR	n.a.
	ABB	CH	OP
	Siemens	DE	MP
	Rockwell Automation	US	n.a.
Efficient motors	ABB	CH	OP
	Siemens	CH	MP
	Baldor Electric	US	n.a.
Efficient steam systems and heat transfer	Spirax-Sarco	UK	n.a.
	Alfa Laval	SE	n.a.
Enzymes	Novozymes	DK	n.a.

Source: UBS WMR, as of 23 June 2008

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IT and Power Electronics

Information technology (IT) and power electronics are typical cross-cutting technologies used in all sectors and almost all applications and cannot be clearly attributed to any of the above-mentioned areas. Information technology is an integral part of business processes, goods, control systems, information and telecommunication systems. While IT can contribute to the so-called dematerialisation of society, its support infrastructure is increasingly consuming vast amounts of electricity. The average server today consumes four times as much power as 10 years ago, and the server density has increased in the same time span (see Fig. 24). This increased electricity use paired with soaring electricity prices is fast resulting in a situation where the electricity bill for operating IT infrastructure and cooling may actually become close to the amount that data centers spend on new hardware (see Fig. 25). Hence, reduction of energy use is becoming a main driver for reducing operational costs for IT organisations.

Climate change policies may also have an influence on these technologies via efficiency standards of electronic equipment and appliances. However, R&D in IT and electronics is primarily driven by the desire for increased speeds, voltages, currents and miniaturisation. IT and power electronics have great potential to reduce energy use of current systems and applications. For example, the Fraunhofer Institute estimates that appropriate power management measures could save up to a quarter of the total electrical energy produced. Nevertheless, it has to be borne in mind that the role of these technologies is ambivalent. The overall effect of energy efficiency improvements in IT and electronics has in the past probably been an increase in absolute energy use, as IT's contribution to economic growth can cause a so-called rebound effect: the resources freed thanks to the energy savings are being used to fund new energy-wasting consumption, thereby partly or wholly compensating the efficiency gains.

Investment Opportunities

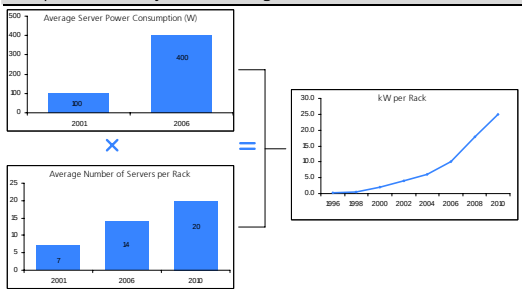
Even though the role of these technologies may be ambivalent due to concerns about their contribution to a reduction of absolute energy use, progress in these technologies is indispensable for further energy efficiency. Companies that can help reduce energy use of electric and electronic goods and IT organisations should be well positioned. We consider the following two areas to be particularly promising.

- ***Virtualisation*** is a technology that can significantly reduce power and cooling consumption by consolidating underutilised servers and improving power management across a farm of servers. Physical machines are thereby converted into fully functional virtual machines, increasing the utilisation of its server hardware from 10-15% to as much as 80%, according to VMWare.
- ***Power electronics*** is the application of electronic circuits to energy conversion. The task of power electronics is to control and convert electrical energy as efficiently as possible. Power electronics is everywhere, as an integral part of transformers, switches, motors and generators and is contained in almost all electronic products used in modern homes, communication, industrial production, energy technology and transportation.

Figure 26 gives an overview of companies with exposure to energy efficiency in IT and Power Electronics. This is not a recommendation list, and the list is by no means exhaustive.

Fig. 24: Power density of server racks

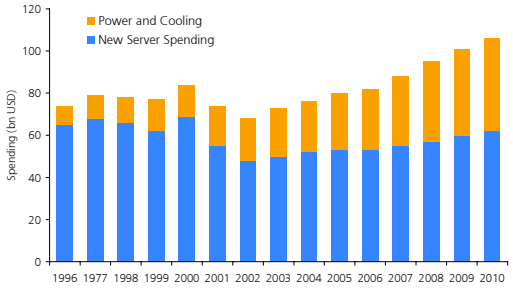
The power density is increasing



Source: VMWare/IDC, 2007

Fig. 25: Worldwide IT spending on servers and on power and cooling

Costs for power and cooling are approaching spend on new servers



Source: VMWare/IDC, 2007

Fig. 26: IT and Power Electronics – Investment areas

Area	Company	Country	WMR Rating
IT and efficient IT use	VMWare	US	UP
Power Electronics and Semiconductors	Intel	US	MP
	Texas Instruments	US	MP
	Cypress Semiconductors	US	OP

Source: UBS WMR, as of 23 June 2008

As our ratings may change over time, we advise to always check on our individual stock ratings.

Investment horizon and risk

Energy efficiency is a long-term theme (at least 3-5 years) and the described drivers may take several years to fully materialize. Further, diminishing commitment by governments to tackle climate change, and strongly falling energy prices are the two main negative risks, which could weaken our investment case.

We also point out that investing in companies availing energy efficiency opportunities gives exposure to very specific sectors, which are highly correlated to the economic cycle: Industrials, Consumer Discretionary, Materials and IT. Hence, those companies may offer good long-term opportunities within their respective sector and industry. However, in the short term, the current challenging macroeconomic environment may negatively impact these sectors and overshadow the identified strong drivers.

Socially Responsible Investments (SRI) comment

Many of the companies listed in Figures 9, 14, 20, 23 and 26 are active in the Industrials sector, which has high exposure to activities excluded by certain SRI investors, such as defense or nuclear power. The company universe has been screened to make sure none of the mentioned companies have an exposure greater than 5% of revenues to either of these activities. Some of the recommended companies do have minor exposure, such as Siemens.

The companies listed in Figures 9, 14, 20, 23 and 26 have product and service strategies to address a specific sustainability challenge: energy efficiency. Furthermore, most of our recommended companies (as listed on page one) have leading sustainability practices in general (e.g. human capital management, corporate governance) , others however only average or even below average, though mostly with a positive outlook as viewed by outside institutions that monitor sustainability criteria (e.g. Innovest Strategic Value Advisors). It also has to be noted that areas in which some energy efficiency companies are typically active (construction, infrastructure) have high exposure to corruption and projects generally viewed as controversial (e.g., large construction projects such as dams). With increasing expansion of these companies into emerging markets, this risk is unlikely to decrease. Some of the top sustainability leaders are confronted with such issues too.

Investment Recommendations

On page one, we provide a list of our recommendations. For these companies,energy efficiency is an important driver for a large part of profitability and/or a key growth business area. These companies, described below, appear to be most attractive to us from a valuation point of view.

Companies with multiple exposure

Siemens (Industrial Conglomerates, DE)

Siemens is an industrial conglomerate with major businesses in Power Generation, Power Transmission and Distribution, Medical and Automation, and Drives. Siemens is exposed to energy efficiency in multiple ways, mainly through activities in electricity transmission, variable speed drives and automation systems, building comfort/HVAC solutions, or the energy efficient appliances of its Bosch-Siemens JV. Further, its lighting business, Osram, is one of the two leading lighting manufacturers in the world.

Johnson Controls (Auto Components, US)

Johnson Controls (JC) operates in three main businesses: auto interiors, battery technology, and building efficiency. JC has exposure to energy efficiency in the two areas with the largest potential to achieve CO_2

reductions at low costs: buildings and transportation. Mainly driven by the need to save costs and improve comfort, JC's building efficiency business helps customers achieve high environmental and energy efficiency standards. In transportation, being one of the world's leading battery producers, JC has a direct advantage in the growing market for hybrid vehicles. In 2009, it plans to introduce its first lithium ion battery for a European hybrid vehicle.

ABB (Electrical Equipment, CH)
ABB is an engineering conglomerate with two divisions: Automation and Power Equipment. Both are significantly exposed to energy efficiency. Almost 50% of revenues are derived from the efficient transmission of electricity, with ABB supplying transformers, switchgear, software and solutions to utilities and large users of electricity. ABB's suite of products includes HVDC (high voltage, direct current) technologies, which minimize current loss over longer distances. The company's exposure to energy efficiency in industrial processes is mainly through its automation products and related systems that help optimize the efficiency of manufacturing plants and process industries. With over 40% of sales in emerging markets, ABB is also well positioned to profit from the increasing need to improve energy efficiency in these countries.

Companies with exposure to transportation

BorgWarner (Auto Components, US)
BorgWarner (BWA) is an automotive supplier that designs and manufactures engineered systems and components in two areas: drivetrain & engine. BWA is the second-leading global supplier of turbochargers, and is a primary beneficiary of increasing diesel penetration in various markets, which is driven by better fuel efficiency of diesel versus petrol. The company also offers a wide array of engine and driveline systems and components that help improve fuel economy and reduce emissions.

Michelin (Auto Components, FR)
With slightly below 20% market share, Michelin is one of the top three tire producers globally; the top three together account for roughly 55% of global tire sales. Michelin sells tires for cars, trucks, motorcycles, construction machinery and aircraft. It is the top producer of premium tires with low rolling resistance. Being among the top three with the highest exposure to Europe, Michelin is in a good position to profit from European Commission's plans to address tire efficiency within their climate change strategies.

Companies with exposure to IT/Power Management

Intel (Semiconductors and Semiconductor Equipment, US)
Intel is the world's largest semiconductor chip maker, based on revenue. Intel provides chips, boards, systems and software building blocks to the communication and computing industries. The company's goal is to be the preeminent provider of semiconductor chips and platforms for the worldwide digital economy. Through advancement of energy-efficient technologies that deliver rapid gains in performance, Intel enables increased productivity for computing applications such as servers and notebooks.

Texas Instruments (Semiconductors and Semiconductor Equipment, US)
Texas Instruments is the leading developer of digital signal processing (DSP) and analog integrated solutions for communications, consumer,

computing, and industrial applications. The company has been able to reduce the chip size in many product lines and integrate multiple applications into one chip, offering an attractive value proposition. Smaller chip sizes reduce power consumption, save room on the circuit board, and are more reliable than multiple parts. All these factors play an important role in today's multimedia phones devices.

Cypress Semiconductor Corporation (Semiconductors and Semiconductor Equipment, US)

Cypress Semiconductor manufactures digital and mixed-signal integrated circuits (ICs). The company is well positioned to profit from the increasing need for energy efficiency in digital consumer and industrial markets, particularly with its proprietary programmable systems-on-chips (PSoC). In many designs, such as portable devices, PSoC replaces a dozen or more other components, not only reducing the cost of their customers' designs, but making their circuit boards smaller and power consumption lower. Additionally, the company has a 50-52% stake in SunPower, an industry leading solar products and services company. Sunpower solar panels have the highest efficiency ratio in converting solar energy into electricity.

Appendix

Description and Methodology
The stocks selected for this investment theme have a significant exposure to energy efficiency, and are all expected to profit from strengthening energy efficiency policies. This means that energy efficiency is an important driver for a large part of the company's profits and/or is an important driver for a key growth business area of that company. The stocks also must have a Buy or Hold recommendation from Wealth Management Research (WMR) to be selected.

The investment theme is monitored and updated for rating changes. Changes to the list will occur when stocks are judged to offer better opportunities relative to the investment theme.

Statement of Risk
Stock market returns are difficult to forecast because of fluctuations in the economy, investor psychology, geopolitical conditions and other important variables.

Appendix

Terms and Abbreviations

Term / Abbreviation	Description / Definition
1H, 2H, etc. or 1H07, 2H07, etc.	First half, second half, etc. or first half 2007, second half 2007, etc.
1Q, 2Q, etc. or 1Q07, 2Q07, etc.	First quarter, second quarter, etc. or first quarter 2007, second quarter 2007, etc.
2007E, 2008E, etc.	2007 estimate, 2008 estimate, etc.
ADR	American depositary receipt
AUM	Assets under management = total value of own and third-party assets managed
bn	Billion (10^9)
bp or bps	Basis point or basis points (100 bps = 1 percentage point)
BVPS	Book value per share = shareholders' equity divided by the number of shares
CAGR	Compound annual growth rate
Cant Inc/Capita	Cantonal income per capita (Switzerland only)
Capex	Capital expenditures
CFO	1) Cash flow from operations 2) Chief financial officer
CFPS	Cash flow per share
Cost/Inc Ratio (%)	Costs as a percentage of income
CPI	Consumer price index
CR	Combined ratio = ratio of claims and expenses as a percentage of premiums (for insurance companies)
CY	Calendar year
DCF	Discounted cash flow
DDM	Dividend discount model
Dividend Yield (%)	Dividend per share divided by price per share
DPS	Dividend per share
EBIT	Earnings before interest and taxes
EBIT Margin (%)	EBIT divided by revenues
EBIT(D)A	Earnings before interest, taxes, (depreciation) and amortization
EBITDA Margin (%)	EBITDA divided by revenues
EBITDA/Net Interest	EBITDA divided by net interest expense
EBITDAR	Earnings before interest, taxes, depreciation, amortization and rental expense
EFVR	Estimated fair value range
EmV	Embedded value = net asset value + present value of forecasted future profits (for life insurers)
EPS	Earnings per share
Equity Ratio (%)	Shareholders' equity divided by total assets
EV	Enterprise value = market value of equity, preferred equity, outstanding net debt and minorities
FCF	Free cash flow = cash a company generates above outlays required to maintain/expand its asset base
FCF Yield (%)	Free cash flow divided by market capitalization
FFO	Funds from operations
FY	Fiscal year / financial year
GDP	Gross domestic product
GF	Grandfathered status
Gross Margin (%)	Gross profit divided by revenues
h/h	Half-year over half-year; half on half
Interbank Ratio	Interbank deposits due from banks divided by interbank deposits due to banks

Term / Abbreviation	Description / Definition
Interest Coverage	Ratio that expresses the number of times interest expenses are covered by earnings
Interest exp	Interest expense
ISIN	International securities identification number
LLP/Net Int Inc (%)	Loan loss provisions divided by net interest income
LLR/Gross Loans (%)	Loan loss reserves divided by gross loans
m/m	Month-over-month; month on month
mn	Million (10^6)
n.a. or NA	Not available or not applicable
NAV	Net asset value
Net Debt	Short- and long-term interest-bearing debt minus cash and cash equivalents
Net Int Margin (%)	Net interest income divided by average interest-bearing assets
Net Margin (%)	Net income divided by revenues
n.m. or NM	Not meaningful
NPL	Non-performing loans
Op Margin (%)	Operating income divided by revenues
p.a.	Per annum (per year)
P/BV	Price to book value
P/CFPS	Price/Cash flow per share
P/E	Price to earnings
P/E Relative	P/E relative to the market
P/EmV	Price to embedded value
PEG Ratio	P/E ratio divided by earnings growth
PPI	Producer price index
Prim Bal/Cur Rev (%)	Primary balance divided by current revenue (total revenue minus capital revenue)
Profit Margin (%)	Net income divided by revenues
q/q	Quarter-over-quarter; quarter on quarter
ROA (%)	Return on assets
ROCE (%)	Return on capital employed = EBIT divided by difference between total assets & current liabilities
ROE (%)	Return on equity
ROAE (%)	Return on average equity
ROIC (%)	Return on invested capital
Solvency Ratio (%)	Ratio of shareholders' equity to net premiums written (for insurance companies)
Tax Burden Index	Swiss tax index; 100 = average tax burden of all cantons
Tier 1 Ratio (%)	Tier 1 capital divided by risk-weighted assets; describes a bank's capital adequacy
tn	Trillion (10^{12})
Valor	Swiss company identifier
WACC	Weighted average cost of capital
UBS WMR	UBS Wealth Management Research
y/y	Year-over-year; year on year
YTD	Year-to-date

Appendix

Required Disclosures

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The EFVR is the price range within which the analyst estimates the stock to be fairly valued. The estimation of the EFVR is based on methods such as a discounted cash flow valuation or a valuation multiples comparison. In the definition of the EFVR, analysts take into account the risk profile (predictability) of the stock.

Absolute Stock Rating System

Buy
We believe the stock is undervalued relative to current market prices.

Hold
We believe the stock's current market valuation is within a fair range.

Sell
We believe the stock is overvalued relative to current market prices.

Under review
Upon special events that require further analysis, the stock rating may be flagged as "Under review" by the analyst.

Suspended
If data is not valid anymore, the stock rating may be flagged as "Suspended" by the analyst.

Restricted
Issuing of research on a company by WMR can be restricted due to legal, regulatory, contractual or best business-practice obligations which are normally caused by UBS Investment Bank's involvement in an investment banking transaction in regard to the concerned company.

Industry Sector Relative Stock View	
Outperform (OUT)	Expected to outperform the benchmark
Marketperform (MKT)	Expected performance in line with the benchmark
Underperform (UND)	Expected to underperform the benchmark

Current WMR Global Rating Distribution (as of last month-end)			
Buy	27%** (48%*)	Outperform	32%*** (53%*)
Hold	62%** (54%*)	Marketperform	46%*** (46%*)
Sell	2%** (44%*)	Underperform	12%*** (45%*)

* Percentage of companies within this rating for which investment banking services were provided by UBS AG or UBS Securities LLC or its affiliates within the past 12 months. Source: UBS WMR, as of 1 June 2008

** At present, not all securities in WMR's global coverage universe have been assigned an Absolute Stock Rating in a Corporate Report. The Absolute Stock Rating distribution calculation includes only securities that have been assigned an Absolute Stock Rating as of the last month-end.
*** Under our Industry Sector Relative Stock View system, "Outperform" most closely corresponds with a "Buy" recommendation, "Marketperform" most closely corresponds with a "Hold" recommendation, and "Underperform" most closely corresponds with a "Sell" recommendation

Appendix

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