

# Using Energy Efficiently

Efficiency optimization  $\eta$

$$\eta [\%] = \frac{P_{\text{output}}^*}{P_{\text{input}}^*}$$

$P^*$  - power

Energy demand  $\uparrow +100\%$  by 2030



[www.infineon.com](http://www.infineon.com)



Never stop thinking

# Using energy efficiently

with semiconductors from Infineon Technologies

The forecasts for global energy consumption, made at the beginning of the century for the coming 30 years, call for deliberate and responsible action by all the nations, organizations and people of this world.

The total energy demand across the globe is projected to rise over 100 percent to 30.1 million GigaWatt-hours by the year 2030. It is therefore imperative to use energy more efficiently in the future. Technologies and products from Infineon Technologies will help to achieve this major goal.

## 1. The global situation

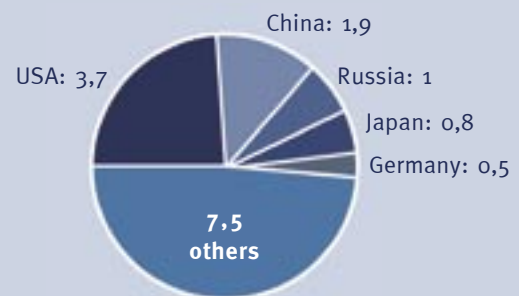
The global increase in energy needs poses one of the great challenges for the future. About one-third of the energy required worldwide today is in the form of electricity. Global electric power consumption increases annually by about 2.7 percent. At present, the USA and China are the largest consumers of energy and electricity, but the energy demand is also rising in Europe.

Building new power stations and tapping new energy sources will no longer suffice to meet future needs. The world's nation states, communities of states, and organizations must act. New, intelligent solutions must be found to reduce energy consumption.

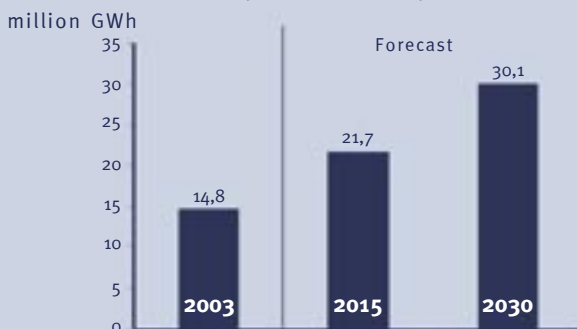
Global energy consumption 2004



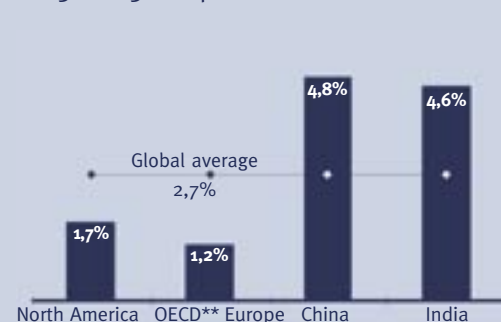
Global energy consumption 2004: 15.4 million GWh



Global electric power consumption 2003 - 2030 i



Electric power consumption - annual growth 2003 - 2030 in percent



Source: EIA (International Energy Association), International Energy Outlook 2006

\*GWh = GigaWatt-hours

\*\*OECD = Organisation for Economic Cooperation and Development



## 2. The political playing field

The European Union (EU) has encouraged widespread debate by publishing the “Green Paper on Energy Efficiency”. The intention of this document is to put a halt to the increasing energy demand by means of intelligent consumption, which may even reduce usage by up to 20 percent by the year 2020. The EU’s proposals for improvement are aimed essentially at:

- Stopping energy wastage
- Investing in research and development in order to use energy more efficiently, and thereby defining energy savings potential, and
- Ensuring the security of the energy supply.

The EU has also identified significant potential for promoting efficiency in generating electricity.

Enhancing energy efficiency goes hand-in-hand with a distinct improvement in environmental protection so that the Kyoto climate protection target can be reached more rapidly.

In publishing the energy strategy for Europe, the European Commission under the presidency of José Manuel Barroso has made a clear commitment to a sustainable energy policy, spelling out specific criteria for verifying results.

Various regional initiatives show that if focused measures are implemented and rigorously pursued on the political and economic front, energy resources can be used efficiently and responsibly.

## 3. Infineon Technologies - a responsible industrial enterprise

The commitment of Infineon Technologies to responsible use of natural resources goes beyond its own production; the company pursues an ongoing quest for more efficient use of energy during semiconductor production. Our company is conducting intensive research to improve the energy efficiency of our semiconductor products. Infineon chips are used in many products such as automotive electronics, mobile telephones, and even to control systems in industrial plants.

Infineon, as a member of the European Semiconductor Industry Association (EECA ESIA), has joined its fellow members in pledging to reduce chlorinated fluorocarbon (CFC) emissions to lower levels than the targets of the Kyoto Protocol.

# SAVING ENERGY

## 4. Infineon products help to save energy in private households and industry

Private houses, most notably in the USA and in Europe, are particularly large energy consumers. Apart from the promotion of environmentally conscious consumer behavior, a special challenge is posed by making household appliances use energy more efficiently. Infineon's Power Management & Drives Division concentrates on reducing power loss in electronic equipment, and on efficient use of energy.

Consumers benefit directly from Infineon's efforts by saving money on energy. Microchips are used in a wide spectrum of applications and their energy savings potential is vast!

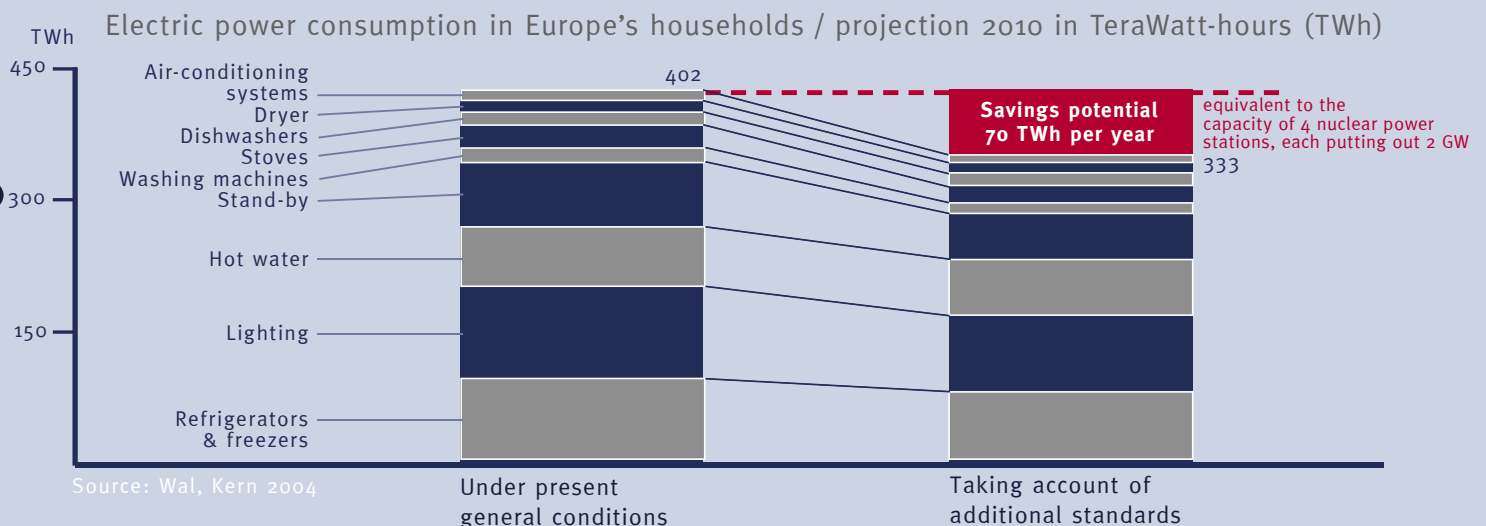
Ranking among the most inefficient energy consumers in European households are lighting, air-conditioning systems, and electrical appliances or devices in the standby mode. The unproductive standby mode accounts for about 1.5 percent of the entire power consumption in the USA. A 90 percent reduction in power loss is already technically possible, and could save some 3-4 billion US dollars in the USA alone.

In 2001 the International Energy Agency (IEA) conducted a study of the energy consumption resulting from the standby mode of various household appliances in the 30 member states of the OECD. The study found that the capacity of all the wind-power stations in the world falls far short of that required to cover the energy demand from the standby mode of household appliances.

## Savings potential in private households

taking account of additional minimum standards for electrical and electronic appliances in

Taking into account additional minimum standards, a vast amount of energy can be saved in households.





The following examples point up the enormous energy savings potential that can be achieved today with Infineon technology:

### Household electronics - TV sets

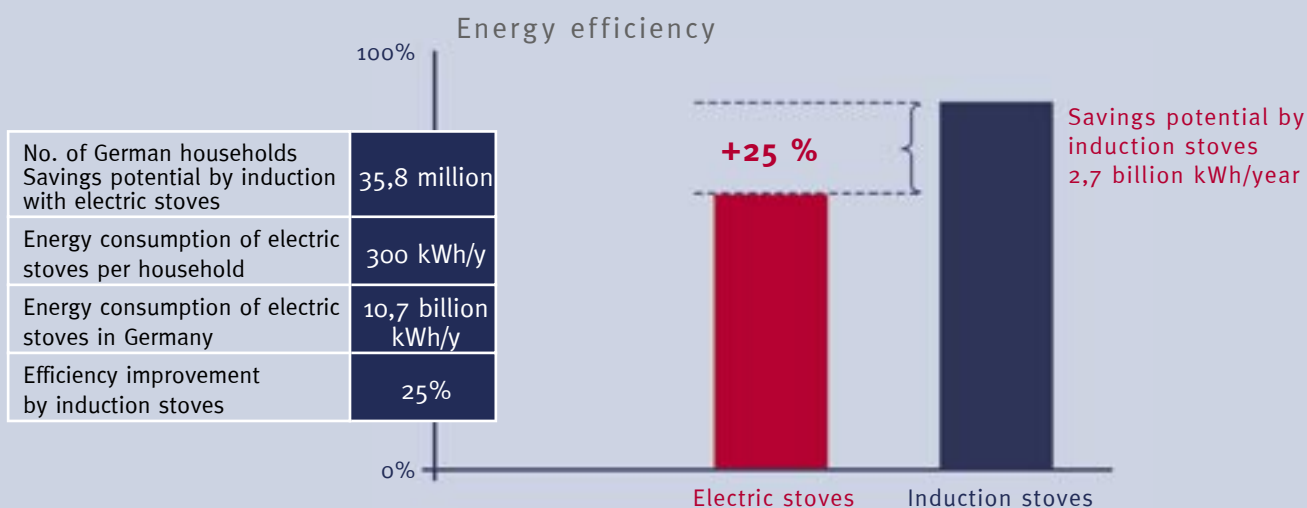
In Europe's households there are around 200 million TV sets using approximately 15 billion kilowatt-hours of electricity per year in standby mode alone! This is equivalent to around 2000 megawatt (MW). The Infineon CoolSET™ family of chips significantly reduce power consumption, by waking up a TV set from its standby mode more efficiently. Across-the-board implementation of savings guidelines, as recommended by the IEA for instance, could save up to 90 percent (i.e. 1800 MW), which is equivalent to the output of a nuclear power station.

### Household appliances - stoves

European households use mainly gas and electric stoves for cooking. The use of induction stoves is relatively recent, but they have a huge energy savings potential. In Germany alone 35.8 million households have electric stoves that use 10.7 billion kWh of energy per year. Induction stoves equipped with Infineon IGBT products save both electricity and money by being 25 percent more efficient than conventional stoves.

### Induction stoves, case study for Germany

25% efficiency improvement compared to conventional electric stoves



Source: [www.theinductivesite.com](http://www.theinductivesite.com)

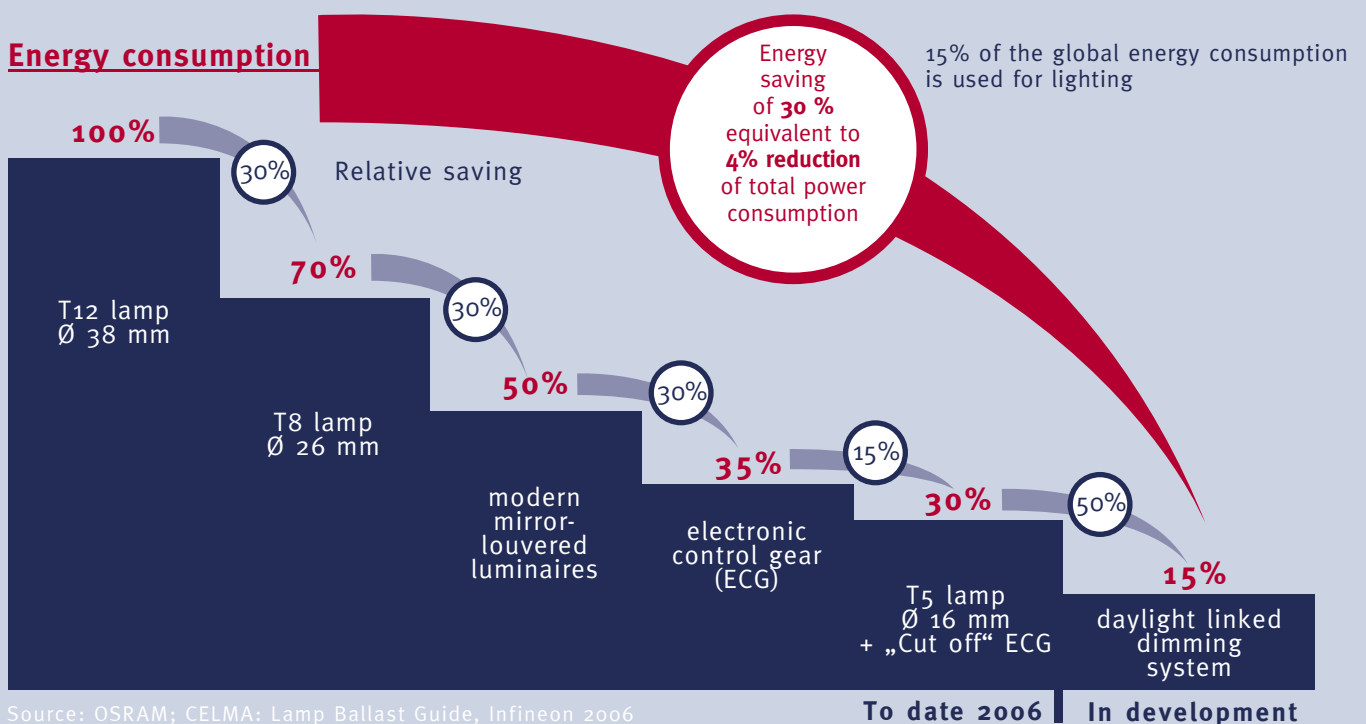
## Lighting

Industrial lighting accounts for a 15 percent share in the global electricity consumption. Improving the efficiency of lighting therefore has significant potential for saving energy.

Various Infineon products from the CoolMOS™ and Smart Ballast IC product range substantially reduce the power consumed by lighting, and therefore contribute to achieving the worldwide targets for CO<sub>2</sub> emissions.

Electronic ballasts with Infineon components can save 70 percent of the power consumed by industrial lighting.

## Energy saving in the lighting sector with Infineon products





## Information technology - servers

The constant growth in data management and archiving is accompanied by an increase in the number of computer servers in IT. Analysts put the number of servers in use across the globe in 2006 at 9.5 million. Forecasts see the number escalating to an estimated 30 million by the year 2011.

The use of Infineon's CoolMOS™ and ThinQ!™ products yields a one-percent increase in efficiency. If these products were used in all these servers, they would save approximately 360 MW or about the output of a conventional hydroelectric power station.

Most of the examples of savings mentioned here can be achieved with existing technologies and products from Infineon Technologies. Further research and the development of new products will help us use energy even more efficiently.

Infineon Technologies will therefore continue to invest in these technologies in the future to successfully face one of today's prime challenges: Increasing energy demand.

### Sources:

EIA – International Energy Outlook 2006

OECD / International Energy Agency


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Wal, Kern 2004

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# Using Energy Efficiently

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