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## Life Cycle Assessment: LEDs Are Really Green

A new study carried out by lighting systems specialist Osram and experts from Siemens Corporate Technology shows that light-emitting diodes (LEDs) are as environmentally friendly as energy-saving lamps, and that their life cycle assessment is far superior to that of conventional light bulbs. The life cycle assessment reveals that 98 percent of the energy used by LEDs over their entire life cycle is consumed while they are lit, and that less than two percent of the total energy use is accounted for by their production. Similar results were obtained with energy-saving lamps. The study thus refutes the claim that the complex production process for LEDs is possibly more energy intensive.

To compare light bulbs and LEDs, Osram used a service life of 25,000 hours as a basis. And the latest generation of LED lamps — the Parathom Classic A55 with Golden Dragon Plus LEDs (eight watts) — do last that long. Twenty-five Osram Classic A 40-watt bulbs, each which can burn for 1,000 hours, would be needed to achieve the same service life.

The comparison makes light bulbs look outdated — and they will be gradually phased out in the European Union. Their production and use requires approximately 3,300 kilowatt-hours (kWh) of primary energy — but only 700 kWh of such energy is needed for the LEDs. What's more, using the LEDs for lighting is four times less costly than is the case with bulbs: The 25 light bulbs in the comparison consume a total of 1,000 kWh of electricity, which amounts to about €210 for electricity and a total cost of €235 (the cost of the bulbs is €25). Just one Parathom LED lamp can provide the same amount of light — and while this lamp cost €40, it only uses 200 kWh of electricity, which costs another €40. The CO<sub>2</sub> balance sheet also shows that LEDs are the superior solution: The electricity needed to operate the light bulbs results in 500 kilograms of CO<sub>2</sub> emissions; LEDs generate only 100 kg.

The life cycle assessment produced by Osram Opto Semiconductors studied the environmental impact of an LED lamp across all production and operational phases, measuring material and energy flows for all components and manufacturing processes, and for shipping. And the study also took into account transport of LED lamps from their production location in China to their sales markets in Europe. The results make definitive statements possible in terms of consumption of resources and primary energy, acidification, eutrophication, the greenhouse effect, ozone reduction, and toxicity. Because LEDs continue to become more efficient, we might be seeing even better life cycle assessment results in the future. In the meantime, the results of the latest internal Siemens study are now being examined by three independent experts. They are scheduled to be published in October. (IN 2009.08.1)

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## Eco-Electricity from Scrap Wood

Scrap wood can now be used on a large scale to obtain energy. To take advantage of this, Siemens has developed a new facility that converts waste wood from wood production into fuel. The energy generated this way can be used to supply thousands of households with electricity and heat. The great thing about this renewable fuel is that it emits much less carbon dioxide than other fossil fuels, such as hard coal. The new system is based on the Reject Power process developed by Siemens Industry Solutions for obtaining electrical energy and process heat through the combustion of waste materials.

The new biomass combined heat and power station in Böblingen has successfully completed its test run. At the heart of the Reject Power facility is a thrower wheel that dries combustible waste from wood production and then propels it at high speeds into the combustion unit. The steam thus generated is converted into electricity by means of a turbine and channeled into a district heating system. The electricity produced is transferred by a generator into the public grid, and this power is enough to provide more than 5,000 people with electrical energy. The Austrian paper manufacturer Mayr-Melnhof is just one company now benefiting from the Siemens Reject Power concept. This concept is part of Siemens' environmental portfolio, which generated €19 billion in sales in fiscal year 2008. The company's target is to achieve sales of €25 billion by 2011.

The Böblingen facility, which is completely new for Germany, offers a major advantage in that it allows the use of scrap wood with high water content, such as that which remains as a byproduct of the process for manufacturing wood chips. Use of such residual particles was inconceivable in the past because conventional wood-chip heating units are unable to process the material. Until now, the residual wood material has therefore been given away for free, but not enough people or companies have been interested in it. The Böblingen facility will burn 20,000 tons of this natural fuel each year — and the resulting low CO<sub>2</sub> emissions will make the power generated there pure eco-electricity.

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