

HOW CAN END CONSUMERS SAVE ENERGY WITH LEDVANCE PRODUCTS?

AGENDA:

- (1) Statistics: energy consumption & development of individual power demand
- 2) Federal regulations and guidelines
- Reasons to save energy?
 - 3.1. Global warming
 - 3.2. Increasing engergy cost
 - 3.3. Energy independence
- (4) Which adjustment screws can be turned in private households?
 (5) How LEDVANCE products can help to save energy and cost

1. STATISTICS: ENERGY CONSUMPTION & DEVELOPMENT OF INDIVIDUAL POWER DEMAND

According to the Statistisches Bundesamt, the average electricity consumption in Germany per household in 2020 was approximately 3.190 kWhⁱ The European average is 4.000 kWh.ⁱⁱ Overall, the total electricity consumption in Europe has been steadily increasing since the 1990s, with an average annual growth rate of about 1,5% despite the trend towards increasing energy efficiency in the EU.

An average household in Germany today consumes most (27%) of the electricity for consumer electronics, i.e., TV, audio and information technology. 13% is used for washing and drying, 11% for cooling and refrigerating devices.

Lighting still accounts for 13% despite the termination of the production and the import of inefficient traditional light sources over the last years that already supported to decrease the share of energy consumption for lighting by 20,6% between 2010 and 2017.ⁱⁱⁱ The main sources of energy in the EU are fossil fuels, including oil, natural gas, and coal, which account for 36% of total electricity production. Renewable energy sources, such as wind, solar, hydro, and biofuels, make up 36,4% of total energy consumption.

The remaining 27% is made up of nuclear energy.^{iv} In Germany the energy consumption still depends even more on fossil fuels as shown in Graph 1.

2. FEDERAL REGULATION AND GUIDELINES

The EU has set a target to increase the overall energy efficiency by at least 32,5% or 260TWh by 2030 compared to the baseline year of 2007. This target includes several measures, such as improving energy efficiency of buildings, appliances, and vehicles and increasing the use of renewable energy.

Here the EU has set a target to increase the share of renewable energy in the EU's energy consumption to at least 32% by 2030. This target includes the use of solar, wind, hydro, and bioenergy technologies for electricity, heating, and transportation.^v

The EU has also set a target to reduce greenhouse gas emissions by at least 40% by 2030, compared to the baseline year of 1990. According to the Paris Climate Agreement Germany targets to reduce its emissions by 65% (based on 1990) by 2030. By 2045 the country that still heavily depends on burning fossil fuels will be completely climate neutral.^{vi}

Around 16% of the EU wide targeted energy efficiency is accounted for by lighting. Thus, their energy consumption is to be reduced by 41,9 TWh.^{vii}





Energy consumption in Germany 2022 vs. 2021



This target can only be achieved if the energy efficiency requirements for light sources are fully implemented. These have been and will be implemented in stages with the EU Single Lighting Regulation 2019/2020 (SLR) and Energy Label Regulation 2019/2015 (ELR).

The revision of EU RoHS Directive 2011/65/EU^{viii} with the banning of compact fluorescent lamps and fluorescent tubes from February 24, 2023, respectively August 24, 2023 will be another important milestone: Most of the popular remaining traditional lamps, i.e., fluorescent tubes and Halogen (G4, GY6.35, G9) will be phased out in the EU by September 1st, 2023 latest. It is estimated that there are about 100 million fluorescent tubes in the DACH region to be replaced into energy efficient LED tubes (source: LEDVANCE GmbH).



3. **REASONS TO SAVE ENERGY**



3.1 Global warming

According to data from the European Environment Agency, burning fossil fuels such as coal, oil and natural gas is a significant contributor to global warming. In 2019 it accounted for about 78% of total greenhouse gas emissions in Europe, including carbon dioxide and methane.^{ix} These greenhouse gases raise into the atmosphere, which trap heat from the sun and cause the Earth's surface to become warmer over time.

Reducing the impact of energy consumption on global warming in Europe can be achieved through a variety of steps, including energy efficiency measures, transitioning to electric vehicles, investing in renewable energy technologies and saving energy.

As stated by the BMZ, the global energy demand is expected to increase by about 33% by 2040, driven by population growth and economic development.^x To meet this demand sustainably, it will be necessary to increase the efficiency of energy use and shift to renewable energy sources, such as solar, wind and hydropower, which do not produce greenhouse gas emissions. The general acceptance in the population is high: according to the opinion polling institute infratest dimap half of the German population is willing to change their lifestyle habits to save the climate.xi



3.2 Increasing energy cost

Over the past ten years the price of electricity has risen continuously. According to the German Association of Energy and Water Industries (BDEW), electricity costs 48,12 Cent/kWh in January 2023 compared to 32,16 Cent/kWh in the previous year or 25,89 Cent/ kWh in 2012. In September 2022 it even reached an all-time high with 60 Cent/ kWh.xii

Many consumers face up to 120% price increase of electricity costxiii, which has a strong impact on their available income. Saving electricity can therefore have a significant impact on the monthly utility costs. Reducing the electricity consumption e.g., by using energy-efficient devices or turning off standby mode, one can help reducing your electricity bill.

According to Statista, the average German household spent about 1.678 Euros on energy in 2020 per year or 140 Euros per month. This is 6,2% of their total expenditures in average but close to 10% for households with income below 1.300 Euros.xiv By using energy more efficiently, individuals can reduce their energy consumption and lower their energy costs. For example, the organization co2online estimates that private households can save up to 320 Euros per year by implementing energy-efficient measures, such as sealing and insulating their homes, using energy-efficient appliances and lighting.xv







3.3 Energy independence

Energy saving in the EU can help to reduce dependence on energy imports from non-EU states. Until Q2 2022 Germany imported 55% of gas from Russia.xvi Even today most of the gas and oil is imported from outside the EU.

Promoting renewable energy sources, such as solar and wind energy, also help EU countries to meet its energy demand from renewable sources rather than relying on imported fossil fuels like oil and gas Introducing energy restrictions and taxes for the use





of energy can also reduce the demand. Overall, energy saving in the EU can help to reduce dependence on energy imports from non-EU states.

Energy conservation can also help to reduce the burden on finite natural resources, such as oil and natural gas. As these resources become scarcer, the cost of extracting and transporting tend to increase, leading to higher energy prices. By using energy more efficiently, we can reduce the demand for these resources and extend their lifespan.



Regulate temperature by using programmed thermostats

Conventional heating control systems regulate the temperature in the best case based solely on local measurements. Advanced smart systems allow users to programme schedules. During defined periods of absence, lower set temperatures in the rooms reduce the energy consumption for heating. According to the Fraunhofer Institute these smart thermostats can reduce the heating energy requirements of the investigated homes by 14-26% through intelligent control of the heat source.^{xx}

Using LED lamps

A simple way to save electricity in private households is to switch from incandescent or halogen to energy-saving LED bulbs. In many households, traditional bulbs are still in use, although the production and import in the EU has been discontinued for years.

By replacing ten 60-watt bulbs with LED lamps one can save 259 euros in electricity costs – with an invest of only ~50 euros. In addition, you avoid 14.000 kg of CO_2 due to the reduced power consumption over the complete life time (source: LEDVANCE energy calculator).



WHICH ADJUSTMENT SCREWS CAN BE TURNED IN PRIVATE HOUSEHOLDS?

According to the European Commission, the average European household could save up to 40% of its energy consumption by implementing energy-efficient measures, such as sealing and insulating their homes, using energy-efficient appliances and lighting, using smart thermostats or switching off standby devices.^{xvii}

One specific area where energy-efficient measures can make a significant impact is lighting. Lighting accounts for a substantial portion of household energy consumption and using energy-efficient bulbs can significantly reduce energy utilization and lower energy bills. Replacing traditional incandescent with energy-efficient LED bulbs already can reduce the energy consumption by up to 85%. According to Statista energy consumption for lighting in Germanys private households has been reduced by 20,6% between 2010 and 2017^{xviii}. This is the biggest saving achieved so far of all categories but still much below it's real potential.

This not only has financial benefits, but it also helps to reduce the demand for energy and reduce greenhouse gas emissions, which contribute to global warming. Here are some possible adjustment screws households can implement:



Turn off standby devices

Standby operation of devices accounts for up to 20% of the electricity costs in an average four-person household and a total of around four billion euros annually throughout Germany.^{xix} Often the standby service costs more than the time that a device actually is in operation. The devices with the highest standby consumption are stereo systems, radios or TVs which all consume approx. 15W in standby each. For comparison: a modern LED bulb consumes only approx. 3-7W – when switched on! Computers, monitors, DVB receivers and printers follow with approx. 10W. Household devices i.e., washing machine or coffee maker still consume approx. 3W in standby. While routers consume still approx. 8W it is not recommended to switch them off completely.

One could save an average of more than 150 euros in electricity costs and avoid 170 kg of CO_2 by switching off standby devices completely instead of just putting them into sleep mode. This can be easily automated by means of smart plugs with timer devices. Especially in areas where the power outlet is not easily accessible such a smart plug is a useful tool.

6

Except for oven lamps all bulbs can be replaced by LED technology today. For oven bulbs with temperatures of a few hundred degrees Centigrade there still is no alternative to the traditional filament technology. All other LED lamps today are 1:1 exchangeable in size and look. Full glass filament LED bulbs are identical to the old incandescent lamps. With 2700 Kelvin most LED lamps offer the warm light that consumers are used to in Central and North Europe. Alternatively, 4000 Kelvin bulbs are also available. This light color is preferred in South and Eastern European countries.

LED bulbs have a much longer lifetime of up to 25 years compared to the old incandescent lamp which lasts only about 1.000 operating hours (about one year). Even compared to the old energy-saving lamp (CFLi), the LED still is the better choice: A single LED bulb saves electricity costs of just under 3 euros per year and avoids still around three kilograms of CO_2 . Different to CFLi the LED bulbs do not contain any mercury and last up to three times longer.

The energy saving potential with the mercury free LED Tubes is - with up to 67% compared to conventional fluorescent tubes – often underestimated. In 2023 the still popular fluorescent tubes will be banned. This is a good opportunity to "ledify" these sockets and by doing so still save energy and money.





Using light only wherever and whenever needed

Light should only be switched on where and when it is needed. Being mindful of light sources and turning off the light always, one is leaving a room, is an important step to save energy.

Smart lighting and controls can help to switch on "light on demand". Sensors used at certain points in the house (stairs, hallways, toilets, basement ...) only switch on the light as soon as a person triggers the sensor. In case of smart lighting, it can be easily checked in an app if lights are still on. The app then also enables a user to change this status regardless of his location.

Identify devices with high energy consumption

Electricity meters help to analyze which devices in the household consume most electricity. Once identified one can decide either to less use those devices or to replace it with modern models in a higher energy class. An old vacuum cleaner for example may use up to 1,6 kWh per hour while a modern device consumes only 0,9kWh at the same time. Energy meters often are integrated in smart plugs as an additional feature.

Using dimmable lights

Dimming with LEDs: Every percent less luminosity also means proportionally less power consumption. Using selectively dimmable smart or non-smart LED bulbs or luminaires create lighting mood as desired and consciously save electricity in dimmed light. It is however recommended to check the compatibility of the installed dimmer switch to the new LED bulb. Since dimming is not standardized some brands might offer only a very limited dimmer compatibility to reduce their production cost. Some brands offer compatibility lists online.

An alternative to preinstalled dimmer switches is the use of smart lighting. These bulbs are dimmable without dimmers but by an app, remote control, smart speaker or cable free smart dimmer switches. The use of such lamps is nowadays very popular.

Using bulbs with better energy class

The industry is constantly improving the luminous efficacy and consequently providing higher energy classes. There are a few standard bulb and candle shape (Classic A and B) Class A or spot LED lamps (GU10) already on the market with energy label A or B, while the majority of the products are sold in energy class F. Such products still are more expensive than the standard ones but the higher price will pay off not only with additional energy savings but also due to the much higher lifetime of up to 50.000 hours.



5. HOW LEDVANCE PRODUCTS CAN HELP TO SAVE ENERGY AND COST

5.1 LED lamps with energy label A

LEDVANCE offers one of the widest ranges of modern and energy efficient LED lamps in brand OSRAM. The most economical range "Energy Class A LED" with 210 Im/ W is a highly efficient alternative even to standard LED bulbs. The range is available in Classic A (bulb), Edison (old style), decorative Globe and spot shape (GU10 currently only in EEL B) – all in full glass filament technology – avoiding any plastic heatsink. The glass covers are made of recycled material. Twelve different types from 40W to 100W replacements are available. They provide even more energy savings compared to standard LED lamps – on average up to 60%. Compared to old incandescent lamps they even save up to 93% energy.

With the increased lifetime of 50.000 hours and up to 500.000 switching cycles the superefficient OSRAM EEL A LED lamp from LEDVANCE lasts more than three times longer than a conventional LED lamp but consumes only 1/3 of the energy.

5.2 LEDVANCE Smart+ Plugs help to reduce stand-by power

One could save an average of around 150 euros in electricity costs and avoid 170 kg of CO_2 by switching off standby devices completely instead of just putting them into sleep mode. This now applies to a whole range of devices., e.g. TVs, radios, washing machines, smart speakers and many more. With the wide range of LEDVANCE smart plugs, standby devices can be controlled remotely and automatically. With the timing device over the LEDVANCE app standby devices can be disconnected automatically at a set time from the



power supply after connecting it to a LEDVANCE smart plug.

LEDVANCE offers smart plugs in all current smart protocols: Bluetooth mesh and Zigbee can be easily integrated to and controlled by digital smart speakers, e.g. Alexa or Google Nest. They also can be integrated into other smart home systems, e.g. Bosch Smart Home (Zigbee), Legrand (Zigbee), Quivicon (Zigbee), Somfy Tahoma (Zigbee), Samsung Smart Things (Wifi) and Busch Jäger Free@Home (Wifi).

The LEDVANCE Wifi Smart Plugs do not require any additional gateways. It simply can be added to the home Wifi and then controlled via the 4,5-star rated LEDVANCE WIFI APP. Once on and off timers are set in the app the plug will automatically disconnect the standby device from power and then switch it on at the desired time again. This is extremely helpful especially when the socket is in a place that is not so easily reachable, such as behind a cupboard.

Bestsellers are the very compact LEDVANCE WIFI PLUG (4058075537248) and LEDVANCE OUTDOOR WIFI PLUG IP 44 (4058075729322).

And with a smart power strip like the LEDVANCE Wifi SMART+ 3-way power strip, you can manage three plugs but each individually to control your devices. As an additional feature the devices are then also protected against lightning strikes by the Smart+ 3-way plug. LEDVANCE indoor and outdoor smart plugs are available for all European countries including the special versions for Switzerland, UK and Ireland.



5.3 Identifying devices with high energy consumption with energy tracker

The LEDVANCE WIFI Smart Plugs include an energy tracker in the LEDVANCE WIFI App. This is a useful tool to monitor the energy consumption of devices in standby or working mode and can help to evaluate if a newly purchased more modern device e.g. a fridge would help to lower electricity bills.

Recommended energy trackers are the LEDVANCE WIFI PLUG (4058075537248) and LEDVANCE OUTDOOR WIFI PLUG IP 44 (4058075729322). The energy consumption can be checked in the free LEDVANCE WIFI Smart+ app.

5.4 LEDVANCE Smart+ Movement Sensor

The LEDVANCE Smart+ sensor (4058075731363) with Wifi technology can help to save energy. The cable free installation is simple and easy by means of the included adhesive tape. The battery (six months operating time per charge with five activations per day) can be easily loaded via USB C. No batteries need to be exchanged. The small (60,3 x 60,3 x 20,5 mm) white colored sensor is unobtrusive and can also the switched on manually.

It will notify on motion and record the movement history. Therefore, it can be used as a part of an alarm system or to switch on smart thermostats when entering the house or a room via the Home Connect Plus App. Via the free LEDVANCE Smart+ WIFI App it can also switch on and off LEDVANCE Smart+ lamps and luminaires when needed and help to reduce energy consumption. Preferred application areas are aisles, toilets, basements, staircases, home offices or entry halls.

5.5 LEDVANCE Smart+ Wifi Contact Sensor

The wireless LEDVANCE smart contact sensor mostly is used to signal when a burglar is entering into one's home. The security device will notify via the free LEDVANCE WIFI App that someone is breaking into your home. With the increasing number of Smart thermostats used to regulate heating systems the LEDVANCE Contact sensor is also used to stop the radiator once a window is opened. A normal thermostat would on the contrary open to compensate the cold airflow coming from an open window and increase the energy bill. A smart thermostat, e.g. from BOSCH Smart Home in combination with the WIFI Contact sensor however can shut down the heating system for the period of ventilation via the open window and then go back to normal once the sensor reports that the window is again closed.

To set a routine with the LEDVANCE contact sensor and a smart thermostat of another brand one can simply use the free Home Connect Plus app and set "if ... then ..." rules. The app will combine devices from different brands.

The LEDVANCE Smart+ Contact Sensor (4058075730052) is rechargeable via USB-C. For charging it can be simply removed from its holder. It will operate for six months based on up to five activations per day with one charge.

5.6 OSRAM dimmable LED Lamps

LEDVANCE offers dimmable lamps in brand OSRAM in different shapes and wattages. Already highly efficient, the energy consumption can be further reduced by dimming the lamp. Before buying it is however recommended to check the dimmer conformity. Currently the operation of LED technology in combination with integrated electronic is not subject to an official technical standard. OSRAM LED dimmable lamps cover most of the common dimmers used in Europe. LEDVANCE therefore offers several compatibility lists for matching dimmer. (https://www.ledvance.com/professional/services/ led-lamps-compatibility/dimming-conformity).



5.7 OSRAM LED Lamps and LED Tubes

LEDVANCE offers one of the world's most comprehensive product portfolio of dimmable LED lamps in brand OSRAM. Modern, highly efficient LED Lamps nowadays are available in a stylish incandescent light bulb look. In high-quality glass design and with the new filament technology. Those dimmable retrofits are available in a variety of shapes, wattages, sockets and light temperatures. They look good especially wherever the lampshade does not cover the bulb, for example in chandeliers.

The new OSRAM LED Tube portfolio by LEDVANCE

End consumers can save 15 Euro per tube and year by simply replacing a conventional 58W T8 fluorescent tube by an 18W OSRAM LED Tube. The new LEDVANCE LED tube concept offers a wide portfolio of LED replacement for traditional T8 fluorescent lamps with G13 socket for use in CCG luminaire or on AC mains. Replacements for all traditional T8 FL wattages are in the new portfolio (15W / 16W / 18W / 30W / 36W / 38W / 58W) and offer a good luminous efficiency of 120 lm/W. The new Star Ultra Output portfolio offers even up to 3500lm for high lighting demands. Besides the T8 range LEDVANCE offers LED replacements for T5 fluorescent tubes with energy savings of up to 50% and up to 155 lm/W with high output up to 4000lm. The new packaging concept will make it easy for consumers to find the right replacement in the stores.



5.8 LEDVANCE Smart+ Lamps & Luminaires

Smart Living combines the trend of energy saving and home automatization. It redefines the way we use our living environment. Smart lighting is an important part of this technological development and helps to adapt perfectly to personal rhythms and individual needs at any time of the day. Convenient, intuitive operation when it comes to controlling light in your house or apartment – with smart LED lamps and LED luminaires from LEDVANCE and control via app.

A big range of smart LED luminaires are available from LEDVANCE for indoor or outdoor use. The LEDVANCE SUN@HOME family combines the top trends of lighting: energy saving, better light quality, human centric lighting and intelligent light control. SUN@HOME with energy efficient blue light reduced CRI95 SunLike LEDs has the same effect as natural light and can help improve our physical wellbeing. It has proven positive effects not only on the energy cost but also on active living, restful sleep and concentrated work at home.

LEDVANCE SUN@HOME adapts automatically to the natural biorhythm with a wider range of colors than conventional LEDs – from cozy fireside light to stimulating daylight (2.200 – 5.000 Kelvin). SUN@ HOME is available in classic shape and spotlights, Flex 3m, recessed downlights, frameless and metal design panel luminaires, floor, desk, monitor, wall, ceiling, IP44 bathroom and mood light luminaires. One of the highlights is the SUN@HOME WIFI CIRCULAR pendant luminaire which has been awarded "Best of Design" by the popular German magazine SCHÖNER WOHNEN.



Marc Gerster

Head of Sales B2C and Strategic Partnership Mgmt Europe West bei LEDVANCE, February 2023

ABOUT LEDVANCE

LEDVANCE is one of the world's leading companies in general lighting for professional customers and end consumers. Evolved from OSRAM's general lighting business, LEDVANCE's portfolio includes a broad range of LED luminaires for a variety of different applications, intelligent lighting products for smart buildings, and one of the most comprehensive offerings of advanced LED lamps in the lighting industry.

For more information, visit www.ledvance.com.



- Energieeffizienz. FAQ zum Thema Energieeffizienz in den Bereichen Private Haushalte, Industrie und Gewerbe und Kommunen; bdew, August 2021,
- Stromerzeugung nach Energieträgern in der EU bis 2022, Statista Research Department, 23.1.2023 European Commission, Stepping up Europe's 2030 climate ambition, Brussels, 17.09.2020 Page 5ff
- Die Bundesregierung, Klimaschutzgesetz. Generationenvertrag für das Klima, Berlin, 7.11.2022
- European Commission, Stepping up Europe's 2030 climate ambition, Brussels, 17.09.2020
- *** European Commission, Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS)
- European Energy Agency, Energie, 15.3.2021
- Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, Energie und Klima, 2023 Infratest Dimap, Klimawandel: Bereitschaft zu Verhaltensänderungen in Ernährung und Mobiliät, 9.11.2022
- BDEW, Strompreisanalyse Jahresbeginn 2023, 9.2.2023 xii
- xiii Merkur.de, Strompreis: Bis zu 120% mehr bei bestehenden Verträgen... Patricia Huber 7 12 2022
- xiv Statista, Ausgaben eines Privathaushaltes für Energie (ohne Kraftstoff) in Deutschland in den Jahren 2000 bis 2020, January 2023
- ** Co2online, Stromverbrauch durch Standby: einfach ausschalten, Jens Hakenes, 2023
- xvi Tagesschau, Wie abhängig Deutschland von Russland ist, 27.4.2022
- xvii News European Parliament, Energy Saving: EU action to reduce energy consumption, 1.12.2022
- xix Heise Magazine, c't, Praxis Strom Sparen, Urs Mansmann, 13/2019, S. 72
- Chip, Stromverbrauch im Standby: das müssen Sie darüber wissen, David Ma, 26.10.2022
- Fraunhofer-Instituts für Bauphysik IBP aus der Studie"Vergleich des Heizwärmebedarfs ausgewählter, typischer Wohneinheiten mit wettervorhersagegestützter Heizungsregelung und Abwesenheitserkennung gegenüber einer konventionellen Regelung anhand von dynamischen Simulationsrechnungen", 2022 (EER-021/2022/720)

