



## European Ecodesign – Energy Efficiency What's next?

**As power electronics engineers we have always sought for the highest efficiency power conversion methods, thus minimizing power dissipation and energy consumption. Well before any governmental regulations, the power electronics community has innovated to develop components and topologies that have contributed to saving energy. As energy efficiency regulations have empowered all around the world, further still we have researched into new ways of managing and storing energy but at the same time other environmental parameters have required power electronics manufacturers to integrate Ecological Design (Ecodesign) principles in everything that they do. What will that mean for the power electronics community?**

### **From a Vision to the Ecodesign regulation**

From 1866 when Ernst Haeckel established links between living organisms and their surroundings the ecology has been through a number of steps and cycles.

Sim van der Ryn and Stewart Cowan's research in their book 'Ecological Design' developed the concept of integrating human activities with natural processes and was aimed at minimizing the destructive environmental impact. This was followed in 2002 by the publication of William McDonough and Michael Braungart's manifesto book 'From Cradle to Cradle', and so a lot of initiatives and projects have taken place to develop a circular economy and to preserve natural resources. One practical example is the 'Ecodesign' framework directive proposed on August 1, 2003 by the EU Commission for energy-consuming equipment [COM(2003)0453].

At a time when many power supply efficiency levels were peaking at 82%, standby power consumption was not considered an issue, and energy management within final equipment not even a concept, the EU proposed to improve the overall environmental performance for energy-using products (EuP), with a focus on energy

efficiency but also the environmental impact during the overall product lifecycle.

April 20, 2004: The EU Parliament adopted a resolution on the proposal of an EU Ecodesign framework directive for energy efficiency and other environmental characteristics of products. On July 6, 2005 the proposal became the directive [2005/32/EC], giving two years to applicable countries to implement.

Among a number of products, the directive included external power supplies with a maximum output power of 250W that are intended to work with electrical and electronic household and office equipments [Regulation (EC) No 278/2009]. This directive was updated in October 2019 [Regulation (EU) 2019/1782] and as new technologies are contributing to improved levels of efficiency, it will be revised within a year to add product categories and to adjust threshold values.

Because the EU Ecodesign is very much consumer oriented, a number of activities are supporting them in the choice of buying and using products. For example, an important decision was to make it mandatory for listed products to bear a label indicating the energy efficiency with a comparative scale from the most efficient to least efficient (A to G). Originally created in 1992, and considering technological advances and improved energy efficiency levels, in 2010 the labelling Ecodesign scaling was redefined as A+++ to D and additional information for consumers e.g., noise levels added. The 2010 scaling was confusing and in 2019 the updated labelling regulation reintroduced the original A-G scale, a new calculation method taking real usage in consideration implemented, a QR-Code added [figure 01].

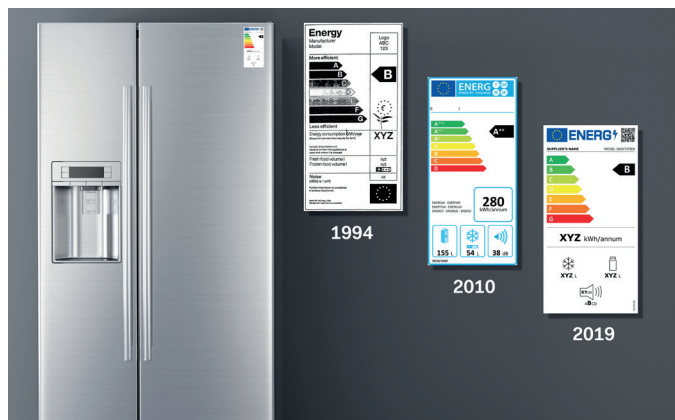


Figure 01 – Ecodesign labels evolution from 1994 to 2019 (PRBX/Sashkin/Shutterstock)

As well, to support consumers, manufactures and retailers, and to ensure a smooth transition from the old labels to the new ones, the European Commission has developed an online database, the European Product Registry for Energy Labelling (EPREL) publicly accessible.

### EU Green Deal and Ecodesign

From its origin the EU Ecodesign was meant to cover more than energy efficiency, but the complexity was such that the commission took a wise approach to make implementation smooth and acceptable by the industry and consumers.

In March 2020 the European Commission adopted the new circular economy action plan (CEAP) [COM(2020) 98], which is one of the main building blocks of the European Green Deal [COM(2019) 640]. The goal of the EU transition to a circular economy is to reduce pressure on natural resources and to create sustainable growth and jobs within the European community. It is also a prerequisite to achieve the EU's 2050 climate neutrality target and to halt biodiversity loss.

As William McDonough and Michael Braungart wrote 20 years ago, the circular economy is a model of production and consumption that involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. These can be productively used again and again, thereby creating further value.

This is a distinct departure from the traditional, linear economic model that is based on a take-make-consume-throw away pattern. This model relies on large quantities of cheap, easily accessible materials and energy. Also part of this model is planned obsolescence, when a product has been designed to have a limited lifespan to encourage consumers to buy it again.

The current Ecodesign Directive 2009/125/EC has a long track record of delivering benefits to businesses, consumers and the environment. In 2021 alone, the impact of the current Ecodesign measures, embracing 31 product groups, saved EUR 120 billion in energy expenditure for EU consumers and led to a 10% lower

annual energy consumption by the products in its scope, and it was time to expand the directive to include circular economy.

In March 2022 the Commission published a proposal for a new Ecodesign for Sustainable Products Regulation (ESPR). The proposal establishes a framework to set eco-design requirements for specific product groups to significantly improve their circularity, energy performance and other environmental sustainability aspects. Among the additional requirement we could highlight product durability, reusability, upgradability and reparability, which have been under discussion for more than five years. Open Public consultation took place from January to May 2023 and is now under discussion for an expected adoption during the first quarter 2024.

**Ahead of future regulations**

Among the additional products to be covered by the EU Ecodesign regulation was a requirements for servers and data storage products [EU Regulation 2019/424]. The objective of the regulation was to limit the environmental impact of these products with a set of rules on energy efficiency, such as the minimum efficiency of power supply units, the minimum server efficiency in the active state, the maximum consumption in the idle state, and information on the product operating temperature. The regulation also takes into account circular economy aspects such as extraction of key-components and of critical raw materials, the availability of functionality for secure data deletion, and provision of the latest available versions of firmware.

Although originally expected to be enforced in January 2023, but due to the ongoing global supply crisis for semiconductor chips brought about by the COVID-19 pandemic resulting in power supplies manufacturers facing longer lead times than initially expected for the delivery of critical components, in December 2022 the Commission issued a notice [2022/C 469/03] postponing the date of implementation to January 2024.

The EU Ecodesign directive for energy efficiency in datacenters is similar to the 80 PLUS, and the level similar

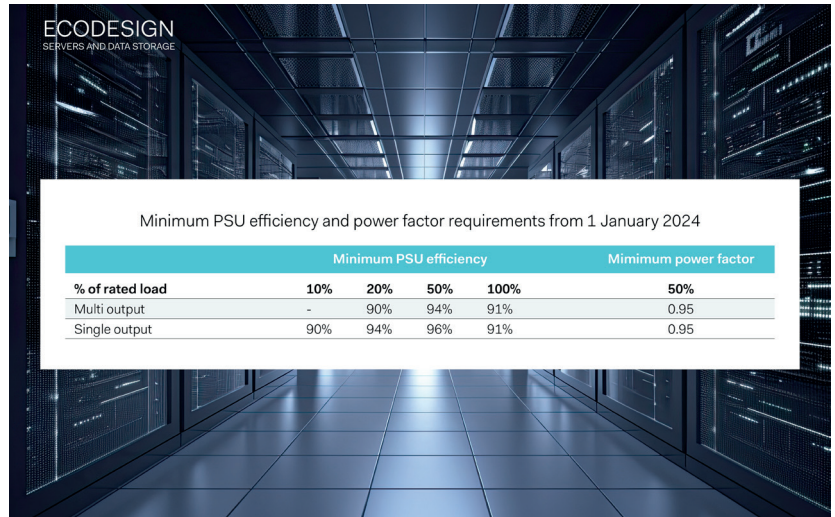


Figure 02: Ecodesign servers and data storage power supply energy efficiency regulation (PRBX/Iftikhar-Alam/Vecteezy)

to Titanium for single outputs, and Platinum for multiple outputs, whilst noticing that the Power Factor Corrector figure of 0.95 is not defined under the same load conditions [Figure 02].

Considering the increased demand on datacenters relating to the development of Artificial Intelligence, the regulatory commission may consider to strengthen the level of requirements, which power supply manufacturers are taking into consideration by adopting Wide Band Gap semiconductors and new adaptive control methods. Ahead of future regulations, WBG semiconductor manufacturers are already offering reference kits and application support to exceed the 80 PLUS Titanium and EU Ecodesign 2019/424 requirements, e.g., the Navitas Semiconductors CRPS185 [Figure 03].



Figure 03: Navitas Semiconductors CRPS185 3,200 W "Titanium Plus" server reference design (With courtesy of Navitas Semiconductor)



### What will be the next step?

Energy efficiency has been the priority, but as we have said, EU Ecodesign is about developing a circular economy and prioritizing extending product life, making products repairable, reusing as much as possible and changing the way we work from 'cradle to grave' to 'cradle to cradle'. As we presented in 2017 and shared in our white paper 'Will the power supply industry adopt the cradle-to-cradle business model?', we are making good progress and the European Green Deal/Ecodesign will help make things happen.

### References:

Powerbox (PRBX)  
<https://www.prbx.com/>

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### About Powerbox

Founded in 1974, with headquarters in Sweden and operations in 15 countries across four continents, Powerbox serves customers all around the globe. The company focuses on four major markets - industrial, medical, transportation/railway and defense - for which it designs and markets premium quality power conversion systems for demanding applications. Powerbox's mission is to use its expertise to increase customers' competitiveness by meeting all of their power needs. Every aspect of the company's business is focused on that goal, from the design of advanced components that go into products, through to high levels of customer service. Powerbox is recognized for technical innovations that reduce energy consumption and its ability to manage full product lifecycles while minimizing environmental impact. Powerbox a Cosel Group Company.



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### About the author

Chief Marketing and Communications Officer for Powerbox, Patrick Le Fèvre is an experienced, senior marketer and degree-qualified engineer with a 40-year track record of success in power electronics. He has pioneered the marketing of new technologies such as digital power and technical initiatives to reduce energy consumption. Le Fèvre has written and presented numerous white papers and

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