

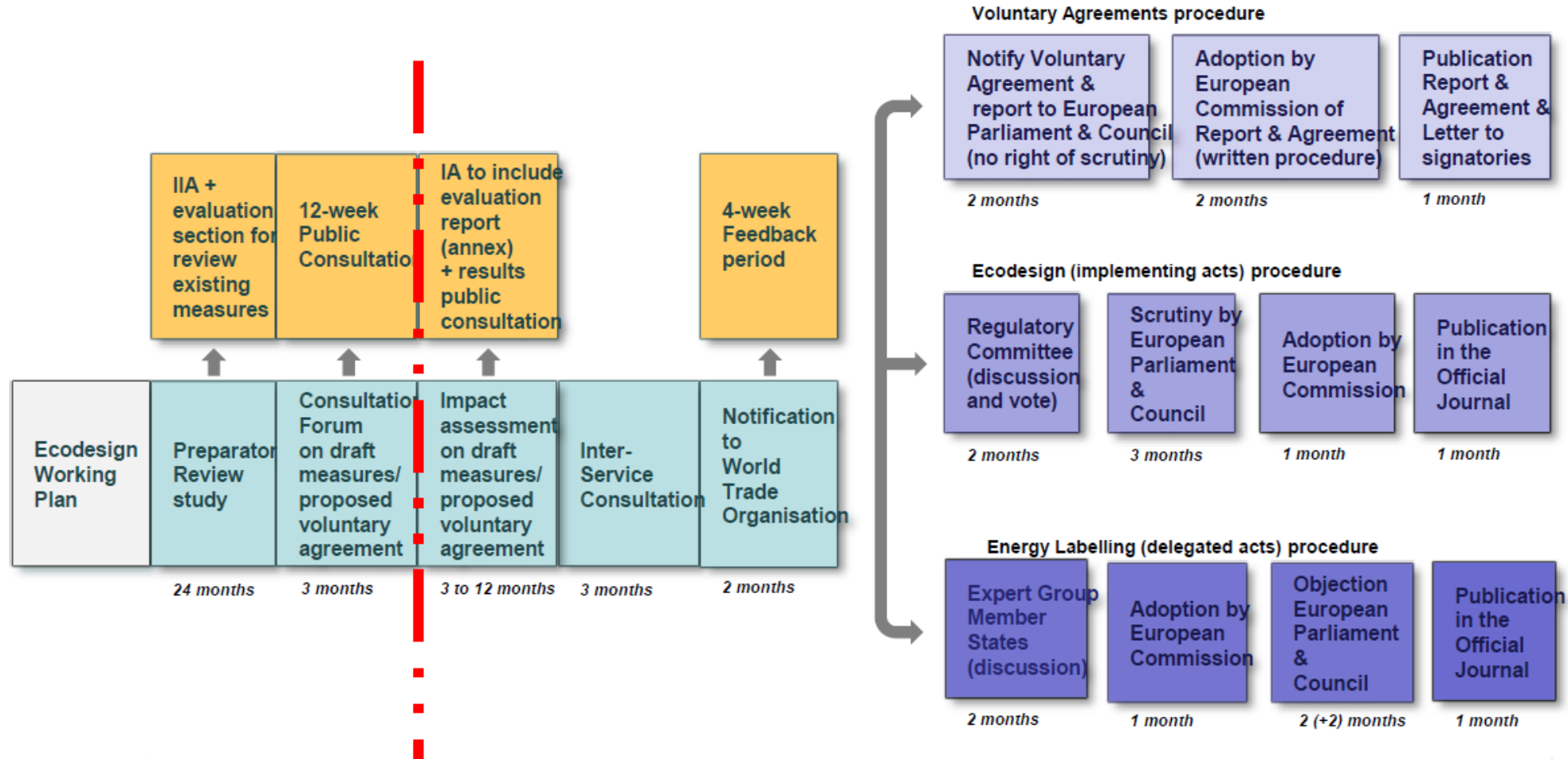
Energimärkning och ekodesign Solcellsmoduler och växelriktare

2022-09-02

Peter Bennich, Eva-Lotta Lindholm & Jonas Pettersson

The policy implementation process

Process for adoption of Implementing Measures under Ecodesign & Energy labelling - Alignment with Better Regulation



Open public consultation will be launched in the upcoming weeks

40 – 42 months – IDEALLY. Reality: can be very different.

Ekodesignkrav på solcellsmoduler och växelriktare

Photovoltaic modules

From 1 **xxx** 2023, photovoltaic modules shall meet the following requirements:|

Omfattning moduler och växelriktare

PV modules

Scope exclusions

- Modules with a DC output power of less than 50 Watts under Standard Test Conditions (STC)
- Building integrated photovoltaics (BIPV)..but **BAPV** in scope
- PV module designs integrated into consumer electronic products, or other multifunctional applications requiring specialised designs for which energy production is not the only purpose/functionality e.g. street furniture, large-area shading, specific agri-PV applications or other similar.
- photovoltaic modules based on new technologies entering the market with a cumulative yearly global production less than 500 MW (with the aim of not dissuading innovation)
- PV modules based (only) on organic perovskite layers

Special consideration for:

- modules containing integrated or embedded micro-inverters (compliance integration)

GROW

PV inverters

Scope exclusions

- *Central inverters that are packaged with transformers (sometimes referred to as central solutions) as defined in Commission Regulation (EU) No 548/2014 on Ecodesign requirements for small, medium and large power transformers.*

Förslagetets kravområden

PV modules

- energy yield (information)
- Durability & Quality assurance of the production process
- Performance long-term degradation
- Repairability
- Recyclability
- Carbon footprint

PV inverters

- Efficiency (quantitative)
- Durability & Quality assurance of the production process
- Smart readiness
- Repairability
- Recyclability

Energy label

- PV modules

Koldioxidavtryckkrav – modul

Maxnivå föreslås för: multi- och monokristallina, CdTe

- Inget förslag på datum för införande

1. From **XX/YY/20ZZ**, for photovoltaic modules models belonging to one of the categories below:

- i. Multicrystalline Silicon photovoltaic modules (multi-Si)
- ii. Monocrystalline Silicon photovoltaic modules (mono-Si)
- iii. Cadmium-Telluride photovoltaic modules (CdTe)

Steg 1

the declared carbon footprint of photovoltaic modules referred to in point (d) of Part 2.1.4 of this Annex shall not exceed 25 gCO₂eq/kWh.

- i. Multicrystalline Silicon photovoltaic modules (multi-Si)
- ii. Monocrystalline Silicon photovoltaic modules (mono-Si)
- iii. Cadmium-Telluride photovoltaic modules (CdTe)

Steg 2

the declared carbon footprint of photovoltaic modules referred to in point (d) of Part 2.1.4 of this Annex shall not exceed 18 gCO₂eq/kWh.

Tunnfilm (utom CdSe) - obligatoriskt informationskrav för koldioxidavtryck.

Krav på koldioxidavtryck

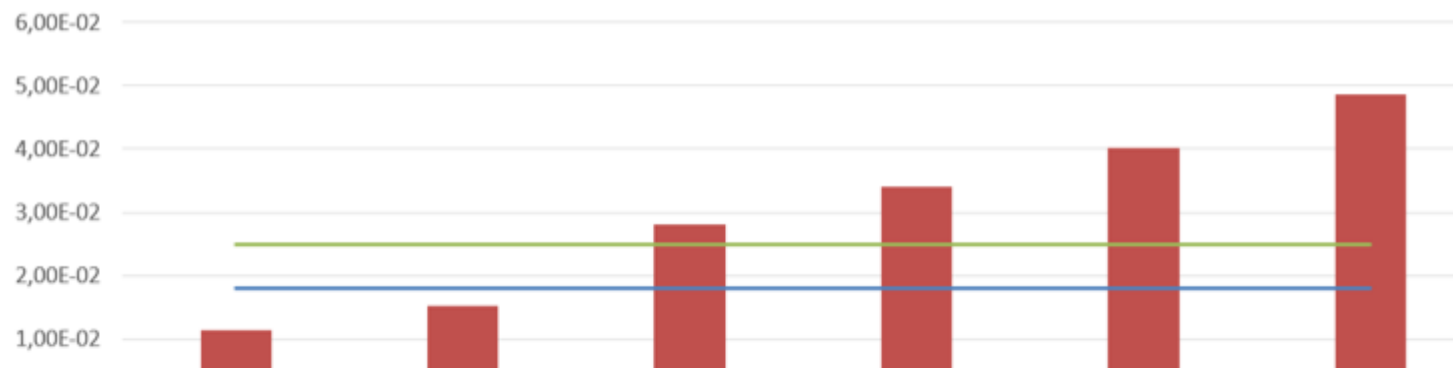
Exempel baserad på olika energimix i tillverkningsfasen

Grön linje = 25 g CO₂-ekv/kWh

Blå linje = 18 g CO₂-ekv/kWh

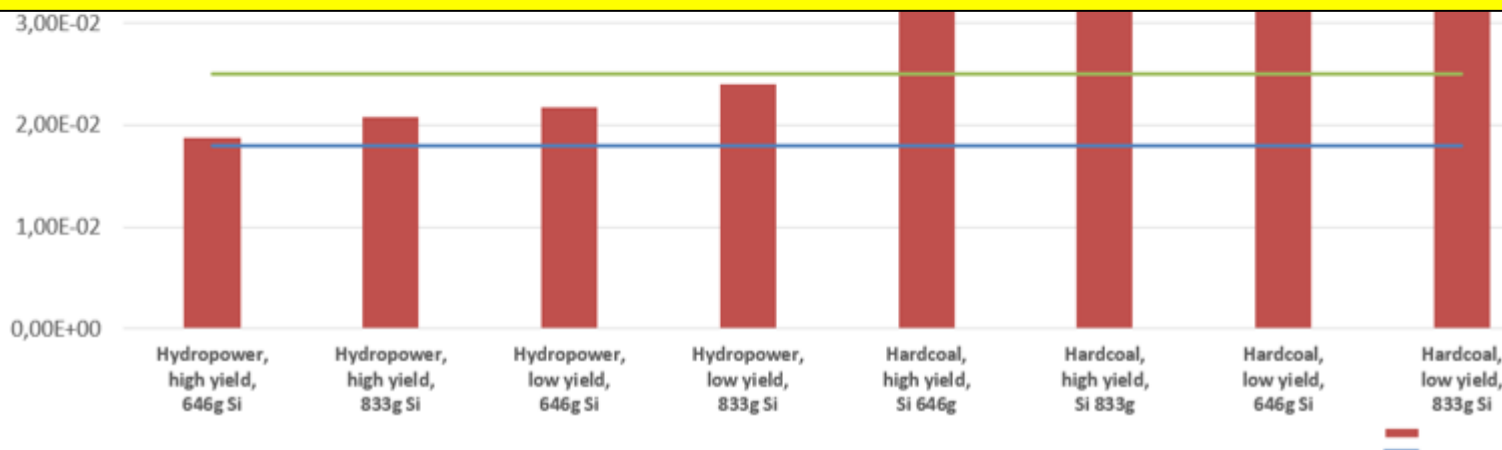
Enhet

Monocrystalline silicon scenarios



Alternativa möjligheter för koldioxidavtryck enligt EU-kommissionen

1. I ekodesign krav på ett högsta tillåtna värde för koldioxidavtrycket (presenterat).
2. I ekodesign enbart informationskrav för koldioxidavtryck
3. På energimärkningen för moduler koldioxidavtryck (*rättslig analys krävs).
4. Istället för koldioxidavtryck: kvantitativa krav på ekodesign för specifika relevanta parametrar som påverkar koldioxidavtrycket, t.ex. kiselhalten eller modulernas avkastning.



Energimärkningskrav på solcellsmoduler

Energieffektivitetsindex EEI_M

The EEI_M is expressed in kWh/m² and calculated as follows for each of the three European reference climatic conditions ‘temperate coastal’, ‘temperate continental’ and ‘subtropical arid’:

$$EEI_{M_c} = \frac{EY_{M(DC) Y1 c}}{A_M}$$

Where:

- $EY_{M(DC) Y1 c}$ is the DC energy yield from one photovoltaic module over one year under the climatic conditions in the reference climate c , assuming no degradation or losses, expressed in kWh.
- A_M is the area of the photovoltaic module expressed in m².

The photovoltaic module is assumed ground-mounted on a fixed-open rack facing the equator with an inclination angle of 20°. Degradation and other losses due to soiling or shadows from surrounding obstacles are not considered. Ground albedo is not considered for monofacial PV modules.

Photovoltaic modules containing micro-inverters integrated/embedded shall be tested before the integration occurs.

DC energy yield: Beräkningsmetod finns i lagstiftningsförslaget. Specifik metod för dubbelsidiga moduler.

Energimärkning



Ska vi lägga till information om koldioxidavtrycket också?

- I. QR code;
- II. supplier's name or trade mark;
- III. supplier's model identifier;
- IV. scale of energy efficiency classes from A to G;
- V. with Annex II;
- VI. the module energy efficiency index value EEI_M under 'temperate coastal', 'temperate continental' and 'subtropical arid' climate conditions, calculated according to Annex IV, expressed in kWh/m^2 and rounded to the unit;
- VII. the lifetime performance degradation rate, expressed in % and rounded to the second decimal place;
- VIII. the photovoltaic module area (A_M), expressed in m^2 and rounded to the third decimal place;
- IX. the number of this Regulation, that is '2022/XXX' [PO- please insert the number of this Regulation in this point and in the right bottom corner of the label].

Mer om ekodesignkrav på solcellsmoduler och växelriktare

Reparerbarhetskrav – moduler & växelriktare

Moduler

User and installer instructions shall be provided in the form of a user manual on a free access website of the manufacturer, importer or authorised representative, and shall include:

- (e) information on how to access and replace the bypass diodes in the junction box;
- (f) information on how to replace the whole junction box of the module;
- (g) information on how to separate and recover the semiconductor from the frame, glass, encapsulants and backsheet;
- (h) information on the feasibility of disassembly without loss of the semiconductor lifetime hours during the dismantling process.

Ska det vara krav att moduler ska finnas som reservdel?

Växelriktare

- (1) availability of spare parts: 15 år
 - **manufacturers, importers:** Inductor(s), Transformers, Power supply/ section boards, Control board, which includes the main microprocessor(s).
 - **Power supply manufactures:** Power semiconductors: Transistor(s), diode(s), Safe and protection components: fuses, relays, varistors or other voltage supresor devices, X and Y capacitors. Capacitor(s) – electrolytic capacitors with short life time (<10000 hours), Input/Output connectors, Power supply when not proprietary designed
- (2) access to repair and maintenance information: 7 år
- (3) maximum delivery time of spare parts: 5 working days
- (4) disassembly requirements: Reparerbarhet (fästanordningar, verktyg, miljö, kompetens)
- (5) Control board: Krav på utbytbarhet och reparerbarhet

Återvinningsbarhet moduler

Informationskrav

- (h) information on how to separate and recover the semiconductor from the frame, glass, encapsulants and backsheet;¶
- (i) information on the feasibility of clean separation without breakage of the glass, contacts and internal layers during the dismantling operations at the end of life shall be detailed.¶
- (j) results of the test on the capability to withstand prolonged exposure in open air climates;¶

Återvinning utreds nu av Riksrevisionen. Era tankar på hur den kan bli bättre?

- → Cadmium (weight range: less than 2 g, between 2 g and 20 g, above 20 g)¶
- → Silicon metal (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Silver (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Indium (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Gallium (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Tellurium (weight range: less than 5 g, between 5 g and 20 g, above 20 g)¶
- → Lead (weight range: less than 5 g, between 5 g and 20 g, above 20 g)¶
- → Metal solder and contacts (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Glass fining agents (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶
- → Phthalates in power cables (weight range: less than 2 g, between 2 g and 10 g, above 10 g)¶

Nästa steg

- Troligen samrådsforum under hösten om LCA: koldioxidavtryck
- EU-kommissionen planerar öppet samråd under hösten 2022

Tidigare samråd på Have your say:

- [Ekodesign – eventuella nya regler om solcellers miljöpåverkan \(europa.eu\)](https://europa.eu)
- [Energimärkning – eventuella nya regler om solcellers miljöpåverkan \(europa.eu\)](https://europa.eu)
- Troligen kommittéomröstning våren 2023
- Läs mer om [Ekodesignprocessen \(energimyndigheten.se\)](https://energimyndigheten.se)
- Följ processen i vårt [nyhetsbrev](https://energimyndigheten.se) och hemsida [Solpaneler och växelriktareSolceller och växelriktare \(energimyndigheten.se\)](https://energimyndigheten.se)

Kontakt

Peter Bennich: peter.bennich@energimyndigheten.se

Eva-Lotta Lindholm: eva-lotta.lindholm@energimyndigheten.se

Jonas Pettersson: jonas.pettersson@energimyndigheten.se