# Swiss PV Circle

Work package 5 - Resale

## Fact sheet on the legal framework for reuse - in particular export

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## Contents





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# Executive Summary

The legal framework for the reuse of PV modules in Switzerland is complex and in a state of flux, in particular due to the increased promotion of the circular economy by the legislator. The Environmental Protection Act (EPA) regulates the collection, treatment and recycling of waste based on Art. 74 of the Federal Constitution. The Ordinance on the Return, Take-Back and Disposal of Electrical and Electronic Equipment (ORDEE) specifies these competences for waste electrical and electronic equipment and was recently amended to extend its scope to all electrical and electronic equipment, including photovoltaic modules. Despite the extension of the scope of the VREG, financing remains unregulated, which is why the existing voluntary industry solution remains in place.

A current implementation aid from the FOEN from 2024 sets out the state of the art for the treatment of electrical appliances, including PV modules, but is not legally binding as implementation is the responsibility of the cantons. In particular, the implementation aid clarifies the intention to dispose of waste: under current law, PV modules are considered waste as soon as owners hand them in and thus express their intention to dispose of them. This means that the handover of PV modules to companies in the solar industry, such as an installation company, already counts as such an act of disposal. Accordingly, installation companies are also considered to be parties subject to the take-back obligation and - depending on cantonal implementation - require a waste authorisation if they not only collect PV modules but also treat them. In addition to the current difficult market situation, this can make the reuse of PV modules even more difficult. Swiss PV Circle is therefore calling for a harmonisation of the approval processes for operating permits under waste legislation for companies in the PV sector across the cantons as well as a uniform documentation requirement for the statistical recording of PV module flows.

The inspection, cleaning and/or repair of PV modules constitutes treatment within the meaning of the implementation guide. The testing of PV modules is crucial for reuse in order to ensure safety and functionality. With regard to testing, European standards such as EN 50614 provide general guidelines for preparing waste electrical equipment for reuse, but these are fairly generic. The guidelines developed as part of the Swiss PV Circle project provide more specific and practical instructions for PV modules (see Deliverable 2.3).

According to the VeVA, the export of PV modules that are considered waste is only permitted to certain countries with the authorisation of the FOEN (Basel Convention). If treatment in the sense of a functional test is carried out before export, such an export may be legally permissible, as a pilot project of the Swiss PV Circle with Ukraine shows. Nevertheless, the export of second-life modules remains an unregulated field with uncertain data, as neither a clear distinction between new and used goods nor reliable volume statistics exist. There are numerous indications that many exported modules are not functional and are disposed of under problematic conditions in the destination countries. An in-depth examination of legal, ecological and geopolitical aspects as well as the targeted development of regulated export structures therefore appears to be urgently required, particularly in view of the increasing quantities of disused modules in the future.



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# 1. Initial situation

The legal framework for the reuse of PV modules and systems is complex and is currently undergoing change, particularly in light of the increased promotion of the circular economy by legislators. This is further complicated by the fact that the legal framework is often not specifically geared towards PV modules, but rather covers all electrical and electronic devices in its general form. Accordingly, the legal framework conditions often leave room for interpretation. However, both the players in the solar industry as well as the legislators and the enforcing authorities are in a continuous learning process in this area. The Swiss PV Circle project can be seen as an important part of this learning process, as its findings provide a sound basis for fact-based decisions.

Against this background, work package 5 of the project focussed in particular on the legal framework for the reuse of PV modules and systems. The results of this investigation are summarised in this fact sheet and are based on discussions and written exchanges with industry representatives, experts from the Federal Office for Customs and Border Security (FOCBS) and the Federal Office for the Environment (FOEN). Findings from a pilot project were also incorporated.

# 2. Legal basis

Based on the article on environmental protection in the Swiss Federal Constitution (Art. 74), the Environmental Protection Act (EPA) regulates requirements regarding the collection, treatment and recycling of waste.1 With regard to the collection of certain waste that is suitable for recycling, the Federal Council can prescribe separate disposal and oblige those placing products on the market to take them back (Art. 30b EPA). The Federal Council may also issue further regulations on the treatment of certain waste (Art. 30c EPA). Finally, the Federal Council may stipulate that certain waste must be recycled if this is economically viable and has less impact on the environment than other disposal methods and the manufacture of new products (Art. 30d EPA).

The Ordinance on the Return, Take-Back and Disposal of Electrical and Electronic Equipment (ORDEE) specifies these aforementioned competences of the Federal Council for waste electrical and electronic equipment.2 According to an explanation of the amendment to the WEEE Ordinance, the scope is to be extended to all electrical and electronic equipment, which means that PV modules are now also covered.3 This is due to the harmonisation of the equipment categories covered by the WEEE Directive with those of the European Union.4 However, the VREG does not yet regulate financing, which is why private-sector financing through an advance recycling levy remains a voluntary industry solution. Based on the parliamentary initiative "Strengthening the Swiss circular economy", it can generally be assumed that potential amendments to the USG, particularly in the context of promoting reusability, could have an impact on the VREG.

For the application of the ORWA, the FOEN prepares a so-called enforcement aid, in particular on the state of the art (Art. 13 ORWA). The state of the art comprises the current state of development of processes,

[1] Federal Act on Environmental Protection (USG).

[2] Ordinance on the Return, Taking Back and Disposal of Electrical and Electronic Equipment (VREG).

[3] FOEN, "Explanatory Notes on the Amendment to the Ordinance on the Return, Take-back and Disposal of Electrical and Electronic Equipment (ORDEE)."

[4] European Parliament & Council, "Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment (WEEE)."


Mit Unterstützung von energieschweiz

equipment and operating methods that (1) have been successfully tested in comparable installations or activities in Switzerland or abroad or have been successfully used in trials and can be transferred to other installations or activities in accordance with the rules of technology, and (2) are economically viable for a medium-sized and economically sound business in the sector concerned (Art. 3 lit. h ORWA). The latest implementation guide from 2024 entitled "Disposal of waste electrical and electronic equipment (WEEE)" therefore forms a "quasi-standard" for the treatment of PV modules, but is not actually legally binding as the implementation of waste legislation is a matter for the cantons.[5] The individual aspects of the implementation guide are explained below.

### 2.1 Advance recycling contribution

As mentioned, the extension of the scope of the VREG will also cover PV modules in future. However, this extension of the scope of application does not yet regulate financing, as the VREG does not include a financing obligation. This means that private-sector financing remains through the voluntary industry solution between SENS eRecycling and Swissolar as the industry organisation. This does not close any financing gaps as a result of free-riding by individual players in the solar industry, which indirectly also makes the realisation of a circular economy model more difficult. However, with the renewed revision of the VREG, the players involved are pursuing the goal of a connection obligation for all. If successful, all manufacturers, importers and dealers of PV modules will have to pay an upfront recycling fee in future, meaning that more money will enter the system.

### 2.2 Will to dispose

Movable objects that the owner discards are considered waste (Art. 7 para. 6 EPA). When owners hand in their PV modules (whether rooftop systems or building-integrated systems) and those obliged to take them back (i.e. manufacturers, importers, dealers and retailers), collection centres or disposal companies accept them, the owner's intention to dispose of them is expressed (Art. 5 WEEE). This act of disposal turns the PV module product into waste electrical and electronic equipment, i.e. waste. Those obliged to take back waste can commission third parties to take it back (Art. 6 Para. 5 VREG). In the case of PV modules, SENS eRecycling is commissioned by the take-back obligors (represented by Swissolar) for this purpose.

Based on the existing legal regulations, there was some legal ambiguity as to when a PV module loses the status of a product and is categorised as waste. In the implementation guide[6] published in 2024 and according to our written exchange, the FOEN has clarified this ambiguity to the effect that the handover of PV modules by their owners to companies in the solar industry is already considered an expression of the intention to dispose of them. This means that the intention to dispose also arises when owners hand over PV modules to an installation company, for example . Installation companies and other players in the solar industry are therefore considered to be subject to the take-back obligation and, if they not only collect, transport or temporarily store the PV modules, but also treat them, i.e. check, clean or repair them, they must also have a corresponding authorisation, provided that this is required by the implementation of waste legislation in the respective canton[7]. Figure 1 illustrates the clarification made in the implementation aid.

[5] Baudin, "Entsorgung von elektrischen und elektronischen Altgeräten (EAG) - Vollzugshilfe zum Stand der Technik."
[6] Baudin.
[7] Ordinance on the Movement of Waste (VeVA).


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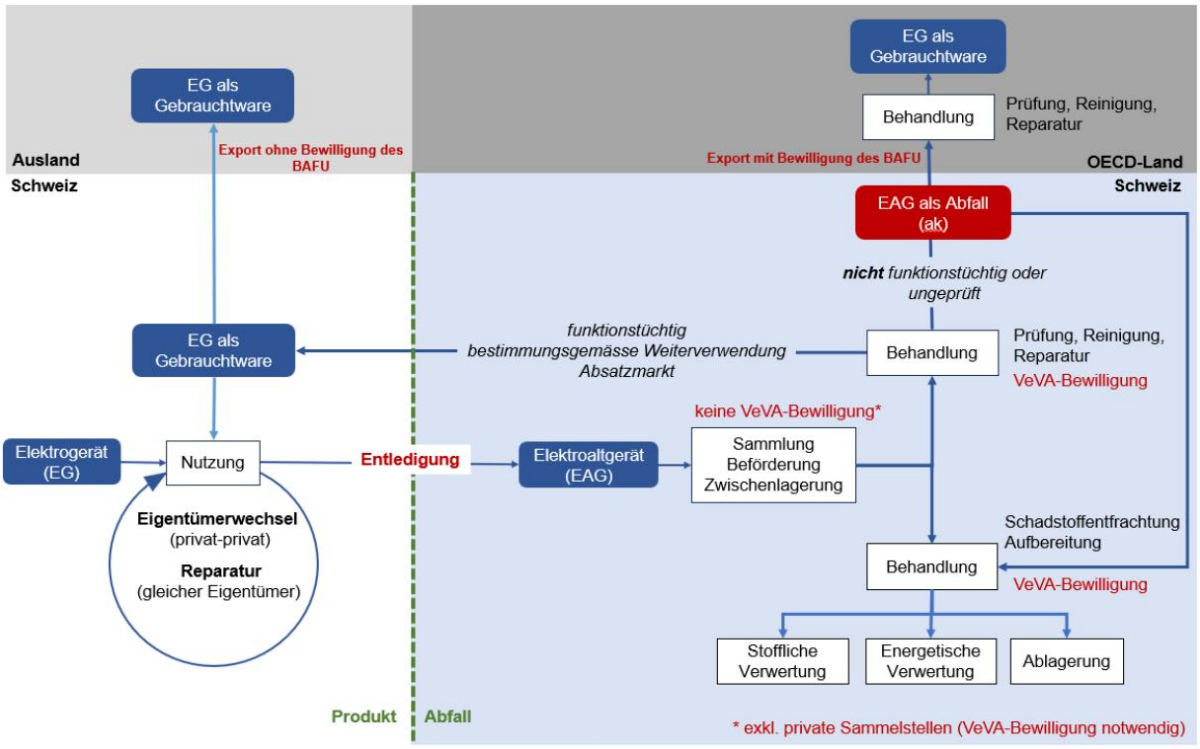


*Figure 1: Disposal routes for waste electrical and electronic equipment according to the FOEN implementation guide.*

### 2.3 Functionality test

Testing the functionality of PV modules - as well as cleaning and repairing them - constitutes treatment (Art. 7 para. 6bis of the EPA). According to the clarification in the FOEN's implementation aid, companies require a licence for this, as the PV modules are classified as waste. However, this regulation does not apply if a company merely receives and temporarily stores the modules. If treatment takes place, it is essential for reuse in the sense of the circular economy that the PV modules are professionally inspected, cleaned and, if necessary, repaired. This is the only way to ensure safety, performance and longevity for a second use. Such tests were carried out and documented in two pilot projects as part of the Swiss PV Circle project.

By treating the PV modules - i.e. testing, cleaning and repairing - waste is turned back into a functional product that can be reused for its intended purpose. Installation companies or other players in the solar industry can treat the modules with the appropriate authorisation, put them back into circulation and even export them as a product. The prerequisite for this, especially for export, is proof of functionality. However, the FOEN's implementation aid does not provide any specific guidelines on how such a test of the functionality of a PV module should be carried out.

At European level, the European Committee for Electrotechnical Standardisation (CENELEC) has issued a mandate to develop standards for the treatment of waste electrical and electronic equipment. These standards, which have been adopted by the Swiss Association for Standardisation, also include requirements for preparing waste electrical and electronic equipment for reuse, which includes PV modules. The EN 50614 standard specifies the corresponding requirements. In particular, the standard shows a procedure for preparing for reuse. This specifies that the waste electrical and electronic equipment must first be weighed and then subjected to an "initial and safety test". The WEEE deemed suitable for reuse should then undergo a detailed visual inspection, a safety inspection, a functional test and cleaning. However, as the standard


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applies to all waste electrical and electronic equipment, its application to PV modules is only of limited use. The guidelines for the reuse of PV modules developed by the Swiss PV Circle project go into more detail here (see Deliverable 2.1 and 2.3)

# 3. Export

### 3.1 Legal framework

PV modules classified as waste may only be exported with the authorisation of the FOEN. Exports can only be authorised to countries that are members of the OECD or the EU and that are also parties to the Basel Convention[8] (Art. 14 para. 1 VeVA). The FOEN made a distinction between waste and used goods in an information document from 2016, where products are classified as used goods if they are (1) functional and authorised for use, (2) used for their originally intended purpose and (3) packaged in such a way that they are not damaged during transport.[9] However, PV modules are not specified in this document. With the new enforcement guideline from 2024, which provides for an authorisation requirement for the treatment, i.e. cleaning, testing and repair, of PV modules, there is now a specification in this respect (see chapter 2.2). In this respect, it can be assumed that previous exports were carried out in a legal grey area.

If the PV modules have been tested for functionality and therefore "treated" in accordance with the nomenclature of the enforcement aid, their export is permitted with appropriate proof. This was realised in a pilot project in the Swiss PV Circle, where PV modules could be exported to Ukraine after being tested for functionality. Ukraine in particular has a high demand for decentralised energy systems, which can also be covered by second-life PV modules.

### 3.2 Relevance and contextualisation

The export of second-life modules is a topic that has received little attention in Switzerland and has hardly been researched. Nevertheless, the issue of exports is important from several perspectives. As part of the Swiss PV Circle project, it was established that a considerable amount of used modules are already being exported from Switzerland. However, even after discussions with industry experts and exporters as well as inspection of export volumes under tariff number 8541.4000 (until 2021) and 8541.4300 (from 2022), no adequate quantitative statement can be made about the exported volume. This is partly because the export volumes do not differentiate between new and used modules. The importing countries listed in the statistics for recent years serve as a guide, including countries such as Vietnam (121 tonnes), Eritrea (19 tonnes), Gambia (51 tonnes), Peru (9 tonnes) and Benin (5 tonnes). It can be assumed with a high degree of probability that no PV modules manufactured in Switzerland were exported.

In general, Swiss PV Circle assumes, despite the unclear data basis, that a considerable proportion of the exported PV modules were not functional or arrived at their destination damaged due to improper transport. PV modules from Switzerland offered for sale on SecondSol - a platform for 2nd-life PV components - confirm this assumption. During the course of the project, offers of entire 2nd-life systems were also discovered on this platform, which were offered for export due to technical defects (e.g. because safety requirements

[8] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

[9] Frey, Hauser, and Rufener, "Export of consumer goods - second-hand goods or waste? Useful tips for traders, transporters and aid organisations."



Mit Unterstützung von energieschweiz

regarding insulation values were no longer met for the modules). Discussions with exporting trading companies also confirm this suspicion.

The export of PV modules raises social, environmental and geopolitical issues. From an environmental perspective, it is problematic that a high proportion of untested modules are exported to these destination countries, often in Africa or the Middle East, which are not functional or have been damaged during improper transport. As a result, the modules are often dismantled in informal e-waste recycling centres under harmful conditions and then disposed of in open landfills.10 The problem is also relevant from a geopolitical perspective, as the export of valuable resources is removed from the material cycles in the long term. The reutilisation of materials through high-quality recycling in Switzerland could help to significantly reduce Switzerland's dependence on imports as a country with few raw materials, in line with the circular economy.

At the same time, the development of targeted export opportunities should not be ignored, as it could be crucial to the success of business models in the area of reuse (see deliverable AP5-1). From around 2030, the forecast quantities of end-of-life modules are expected to exceed demand as the modules from the boom years reach the end of their life. In view of these developments, an in-depth examination of the export of PV modules and systems - for example to European countries - appears necessary, particularly with regard to the legal framework conditions.

# 4. General Classification by Swiss PV Circle

Swiss PV Circle assumes that the clarification of the legal framework conditions through the enforcement aid will make the export of PV modules more difficult, as exporting for companies without a waste licence leads to a violation of the WMA (Art. 61 WMA). Swiss PV Circle welcomes this. However, the clarification also means that companies in the solar industry also require a corresponding cantonal licence in order to be able to reuse PV modules properly (i.e. including cleaning, testing and, if necessary, repair). This can make the reuse of PV modules more difficult, but in the opinion of the Swiss PV Circle it is within the bounds of what is reasonable, taking into account two conditions (see Deliverable 6.1). Firstly, the granting of the necessary authorisations should be as low-threshold as possible, whereby bureaucratic hurdles and excessive administrative processes should be avoided. Secondly, a harmonised authorisation practice among the cantons responsible for implementing waste legislation is essential in order to avoid a "patchwork quilt" across Switzerland. Swiss PV Circle believes that this is particularly important as these cantonal authorisations are linked to a documentation obligation, which means that a standardised practice among the cantons contributes to improving the statistical recording of PV module flows. Given the current lack of data on the reuse and export of PV modules, a reliable data basis is highly relevant for the further development of the circular economy in this area.

Swiss PV Circle welcomes the fact that the enforcement aid and its cantonal implementation create clear framework conditions for the reuse of PV modules in Switzerland, taking into account a low-threshold and standardised authorisation practice. This not only helps to limit the export of non-functional PV modules, but also promotes the professionalisation of those involved in this area. In such an environment, the export of tested, functional PV modules is also still possible, which will become particularly relevant as waste volumes increase. Future enforcement guidelines specific to device categories could help to further clarify the

[10] Frey, Hauser, and Rufener.


Mit Unterstützung von energieschweiz

processes and ensure standardised implementation. The knowledge gained from the experience of Swiss PV Circle could serve as a basis for the further development of such regulations.



Mit Unterstützung von energieschweiz

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