

Swiss PV circle: Data-driven reuse business models for the Swiss solar industry

The project aims to promote circular reuse business models for the solar industry by providing improved access to information on installed PV systems

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Workpackage 1: Database and digital platform development

Used data sources

(1) PV installations

- Identifiers (e.g., xtf_id) used for each installation
- Information on installation date, location, capacity
- Energy data to identify deactivated PV plants
- Installed PV panel types (based on manufacturer)

(2) Collection orders

- Identification of PV modules with an end-of-life (eol) date
- Information on reason that lead to an eol, such as damages (during transport, installation, hail, fire), repowering or end of usage

(3) Satellite images

- Information whether a PV installation is still on the rooftop to validate eol
- Indication on mono- or poly-crystalline panels

(4) Other sources

Merging data on PV systems from different sources via the installation address

Resulting data set contains all the merged information and an estimated average lifespan of PV systems

Database model

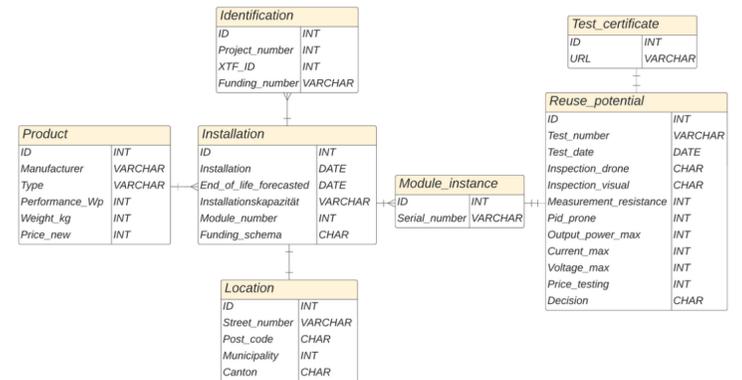


Figure 1: Database model developed from different data sources to enable premature estimations on the end-of-life date. The final model provides the basis for developing the digital platform to enable stakeholder access to the required information.

WP2: Business models

1 Integrated



Installer dismantles, finds suitable second use, checks modules and installs them at his own risk

2 Direct selling



Installer dismantles, partially tests modules, sells (sometimes exports) them, new player installs at his own risk

3 3rd party testing



Installer dismantles, hands over modules to an agent authorised by SENS, who tests, provides a guarantee and sells to a new agent

Sales potential, costs, documentation, quality

WP3: Forecasting

Estimates from various sources resulted in a total of approximately 1.2 tons of end-of-life PVs in 2023, including total quantities from collection orders, estimates of exports to non-European countries and resale in Switzerland. Using this information, first extrapolations forecast a potential increase to 27 k tons until 2050. WP3 aims at refining these aggregated results based on the predicted end-of-life date of every PV installation. This will be estimated by using machine-learning assisted procedures that use information on every PV installation. The final forecast should enable predictions about return quantities (weight and capacity), as well as returning PV panel types.

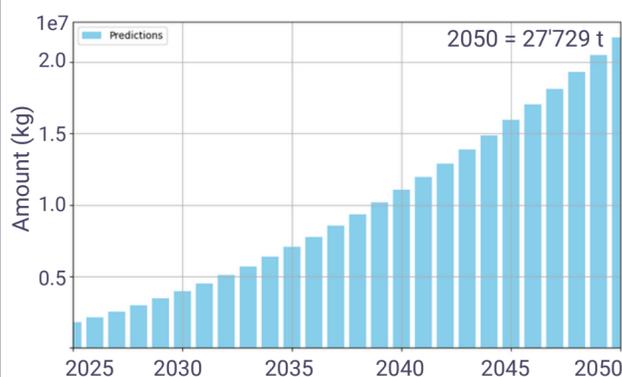


Figure 2: First attempt to predict end-of-life PV amounts (kg) until 2050 using a polynomial regression model.

WP5: Target market

Single PV modules

Mini power plants

- 1 Low volume sales of relatively new modules to end customers (balcony, off-grid property, etc.), mostly platform-based

Replacement of damaged modules

- 2 Sales of replacement modules to insurances/installers with increasing demand, high stock needed, platform-based

Export

- 3 High demand in eastern Europe (e.g., UKR, RO), open questions of waste export, traceability, and end-of-life treatment

Entire PV systems

Upcoming reuse market

- 4 Sales of entirely tested PV systems, if possible including substructure, inverter, etc., to organizations with far developed sustainability targets (CO2, grey energy), properties with solar obligations (interim uses), or organizations with circular economy targets (scope 3 emissions)



Project partner



Project website

