

Open-Source Software for Optimized Operation of Large Solar Thermal Plants



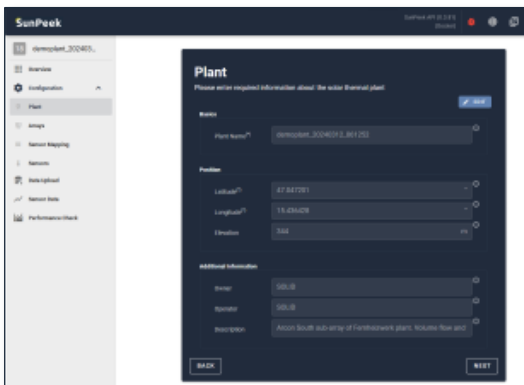
About SunPeek

SunPeek is an open-source tool for **performance monitoring** and **guarantee procedures** of large-scale solar thermal plants. SunPeek introduces the **first open-source implementation** of the Power Check method and is intended as the reference software tool for ISO 24194:2022 (“Collector fields - Check of Performance”).

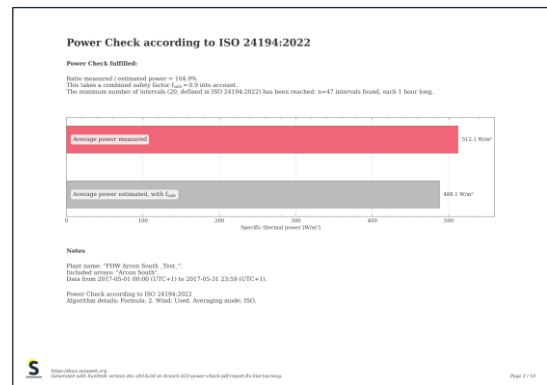
SunPeek has been successfully deployed to several large-scale solar plants. Included with SunPeek is a pre-configured demo plant, featuring one year of open measurement data from the “Fernheizwerk” plant in Graz, Austria. Featuring simple software licenses, SunPeek is available for free for **scientific and commercial use**. Our vision is to advance the state-of-the-art of quality assurance in large solar thermal plants and evolve SunPeek towards an **industry-standard solution** in plant monitoring.

Explore the public SunPeek demo, visit <https://demo.sunpeek.org>

Screenshots



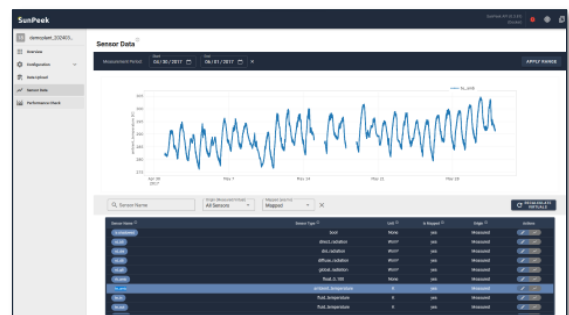
Plant configuration



ISO 24194 PDF Report



ISO 24194 Power Check



Data visualization

Demo Plant “Fernheizwerk Graz”



Location	Graz, Austria
Collector Area	8 206 m ² / 5.7 MW (total) 516 m ² / 361 kW (subfield for demo dataset)
Application	Solar District Heating (SDH) for the Graz DH network
Operator	solar.nahwaerme.at Energiecontracting GmbH

Image source: Picfly.at/Thomas Eberhard

Application

SunPeek streamlines performance assessment of solar thermal plants, ensuring **automation, consistency and transparency**. SunPeek's main use cases include:

- **Performance Guarantees:** Verify guaranteed plant performance, e.g. during plant commissioning
- **Collector Field Efficiency:** Assess efficiency at any time, during ongoing plant operation.

SunPeek's configuration covers many typical **plant configurations and measurement setups** of large solar thermal plants. SunPeek's performance analysis require no changes to plant control. SunPeek facilitates assessment of present and historical data and automates **condition monitoring**, offering continuous **monitoring of plant operation** over the plant's lifespan. Plant operators benefit from cost-effective, automated monitoring and maintenance decision support, resulting in substantial O&M cost reduction.

Software Features & Licensing

SunPeek is free to use for commercial and scientific purposes, featuring OSI-approved software licenses: Backend: GNU LGPL (Lesser General Public License), Frontend: BSD-3-Clause

- **Compatibility:** SunPeek runs on Windows / Mac / Linux
- Automated calculation and comparison of measured and target power and solar energy yield (Power Check according to ISO 24194:2022; Dynamic Collector Array Test)
- Graphical User Interface (GUI) for interactive plant configuration and evaluation
- Standardized interface (REST API) for integration into existing software tools or databases
- PDF report and CSV export of calculation results
- Automated data pipeline for cleanses and calculates measurement data, compensating for missing sensors

Methods

SunPeek implements the **Power Check** method of the new standard **ISO 24194:2022** ("Collector fields - Check of Performance"). This standard covers glazed flat plate, evacuated tube, and tracked, concentrating solar thermal collectors. SunPeek provides **standardized performance assessment**, accounting for key influencing factors such as location, weather, hydraulic design, collector choice, and operating temperatures. This enables fair comparisons across different plants, regardless of temperature levels or collector technology.

Beyond implementing the Power Check method, SunPeek extends ISO 24194 to enhance practical applicability, accommodating, for instance, plants with multiple collector arrays, mixed collector types, automated shading calculation, and adaptation to non-standard sensor configurations. Additionally, SunPeek introduces new algorithms such as the Dynamic Collector Array Test **D-CAT**, enabling simulation-based **solar energy yield checks**. SunPeek aims to evolve into a platform for developing performance-related methods. Ongoing development focuses on condition monitoring and fault detection algorithms.

SunPeek Hub	https://sunpeek.org/
Contact	sunpeek@sunpeek.org
Public Demo	https://demo.sunpeek.org/
Software Repository	https://gitlab.com/sunpeek/
Open Demo Dataset	https://doi.org/10.5281/zenodo.7741083
Zenodo Community	https://zenodo.org/communities/sunpeek



Join the Team

SunPeek relies on community collaboration. As an open-source software tool, SunPeek is developed and maintained through a partnership between research institutes and industry experts. SunPeek's evolution is governed by a non-profit steering committee.

- **Your participation matters.** We invite you to join our mission and we welcome your participation, whether you're a researcher, developer, solar professional or enthusiast.
- **Contact us.** Feel free to reach out to us at sunpeek@sunpeek.org