Workshop “Digital Tools for Solar Thermal Plant Monitoring”

Daniel Tschopp (AEE INTEC) & SunPeek Team

Welcome!

Online Workshop

Digital Tools for Solar Thermal Plant Monitoring

25 June 2024, 2 – 4 pm (CEST, UTC+2)

ORGANIZED BY
AEE INTEC

IN COLLABORATION WITH
SUNPEEK DEVELOPMENT TEAM
SunPeek

SUPPORTED BY
Co-funded by the European Union
Grant Agreement #101083940
EDIH European Digital Innovation Hubs Network
APPLIED CPS
DIHSÜD Digital Innovation Hub

Agenda

1 Handbook “Digital Tools for Solar Thermal Plant Monitoring” (~15 min.)

Philip Ohnewein (AEE INTEC)

2 “Speed Dating” of selected tools (~30 min.)

AEE INTEC + SOLID

3 SunPeek Live Demo + Discussion (~30 min.)

Marnoch Hamilton-Jones (AEE INTEC)

4 Further developments, Q&A (~30 min.)

All

AEE INTEC

Workshop Series „Digitalization of Solar Thermal Plants”

- **Focus**: Demonstrate how to use **digital tools** and **methods** for the monitoring of (large-scale) solar thermal plants & give support for SunPeek users
- **Target group**: Operators of large-scale solar thermal plants and associated compagnies and stakeholders

28 February, 2024

SunPeek Open Source Software (Online)

SunPeek

10 - 11 April, 2024

SunPeek Exhibition Booth at ISEC 2024

25 June, 2024

Digital Tools for Solar Thermal Plant Monitoring (Online)

November 2024

Guide to ISO 24194:2022 + SunPeek Updates (Online)

+ tailored, free workshops for compagnies! Please contact us!

AEE INTEC

SunPeek Eco System

Initiators

AEE INTEC

SOLID solar energy systems

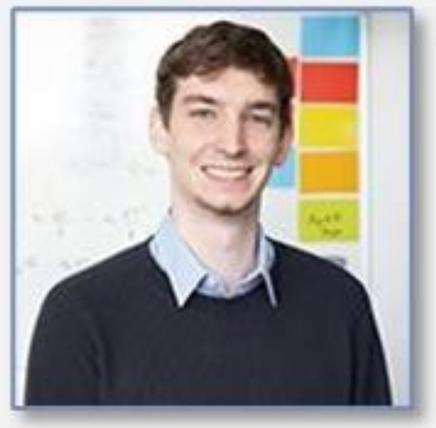
GASOKOL Solar. Seit 1981.

SCHNEID

Steering Committee & Maintainers







Community, Users & Enablers

GitLab

NUMFOCUS OPEN CODE = BETTER SCIENCE

SHC TASK 68

Fraunhofer ISE

Technische Hochschule Ingolstadt

DLR Deutsches Zentrum für Luft- und Raumfahrt

ISFH

nahwärme St. Ruprecht

SolarEngineering GUGGENBERGER

Funding

klima+ energie fonds

acr

Applied CPS Project

Project partners

- The project **Applied-CPS** **(Applied Cyber-Physical Systems)** is an Austrian research project of the Digital Europe Programme, funded by the European Commission and the Austrian Research Promotion Agency
- **Project duration**: 2022/09 to 2025/08
- Applied-CPS offers **tailored services for SME within the European Union** to support the implementation of cyber-physical systems (CPS)
- **Services up to 40 k€ are** fully funded! Please contact us if you are interested! (limited resources available)

Organizational issues

- The workshop will **not** be recorded.
- **Slides** and **additional material** will be distributed after the workshop. Please feel free to share them!
- After each session, there is some time for **longer questions** and **discussion**.
- You may ask **shorter questions** during the sessions directly to the presenter or using the "Chat" function in MS Teams
- Please register through the Applied CPS website if you haven't done this yet: https://www.applied-cps.at/event_kalender/digital-tools-for-solar-thermal-plant-monitoring/

Brief Introduction Round

Contact

- For questions regarding Applied CPS (in particular Service Offers), please contact **Daniel Tschopp** (d.tschopp@aee.at)
- SunPeek General Questions: sunpeek@sunpeek.org
- SunPeek Support: support@sunpeek.org
- For specific requests / problems / bugs, please open issues in https://gitlab.com/sunpeek/

Questions

?

„Digital Tools“ Handbook

1 Handbook “Digital Tools for Solar Thermal Plant Monitoring” (~15 min.)

Philip Ohnewein (AEE INTEC)

2 “Online speed dating” of selected tools (~30 min.)

AEE INTEC + SOLID

Software Tools

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Marnoch Hamilton-Jones (AEE INTEC)

4 Recent developments, Q&A (~30 min.)

All

International Standards, SunPeek

Plant Design
Manufacturing
Simulation

Operation
Commissioning
Maintenance

ISO 9806
EN 12975
EN 12976

ISO 24194 Power Check & more

20-30 years

ISO 24194
"Solar energy — Collector fields — Check of performance"

- International standard that focuses on the performance check of solar thermal collector *arrays* → first standard targeting collector arrays in operation
  - First published in 05/2022 → currently *ISO 24194:2022* + amendment (Amd 1:2024)
  - Collaboration between ISO and CEN (European Committee for Standardization)
  - Plays a key role for on-going operational monitoring and guarantee procedures
  - Bankability and trust in large-scale installations

- Specifies methods how to *compare measured output with its target*:
  - *Power Check* → Denmark, IEA SHC Task 45 & 55
  - Daily Yield Check
  - Annual Yield Check (in preparation)

- How to apply in practice?
  - *Guide* to ISO 24194:2022 – Power Check, Task 68

ISO 24194:2022 “Check of Performance”

- New ISO standard for assessing performance of solar thermal collector fields / plants.
  - ✓ **In-situ**, for plants in operation!
  - ✓ Refers to ISO 9806 (single collector lab tests)
  - ✓ Refers to ISO 9060 (instruments for solar radiation)
  - ✓ Refers to ISO 9488 (solar vocabulary)
- Applicable **Collector types**:
  - ✓ Glazed flat plate collectors
  - ✓ Evacuated tube collectors
  - ✓ Tracking, concentrating collectors
- Defines **2 methods** on paper:
  - ✓ *Power Check*
  - ✓ Daily Yield Check
- ✓ Revision: **Annual Yield Guarantee**
  - ✓ TC180 / SC4 / WG4
  - ✓ Lead by M. Liu & S. Abrecht

Solar energy — Collector fields — Check of performance

(ISO 24194:2022)

Sonnenenergie — Kollektorfelder — Überprüfung der Leistungsfähigkeit (ISO 24194:2022)

Energie solaire — Champs de capteurs — Vérification de la performance (ISO 24194:2022)

Life cycle

Now

Published
ISO 24194:2022
Stage: **60.60**

Corrigenda / Amendments

Under development
ISO 24194:2022/Amd 1

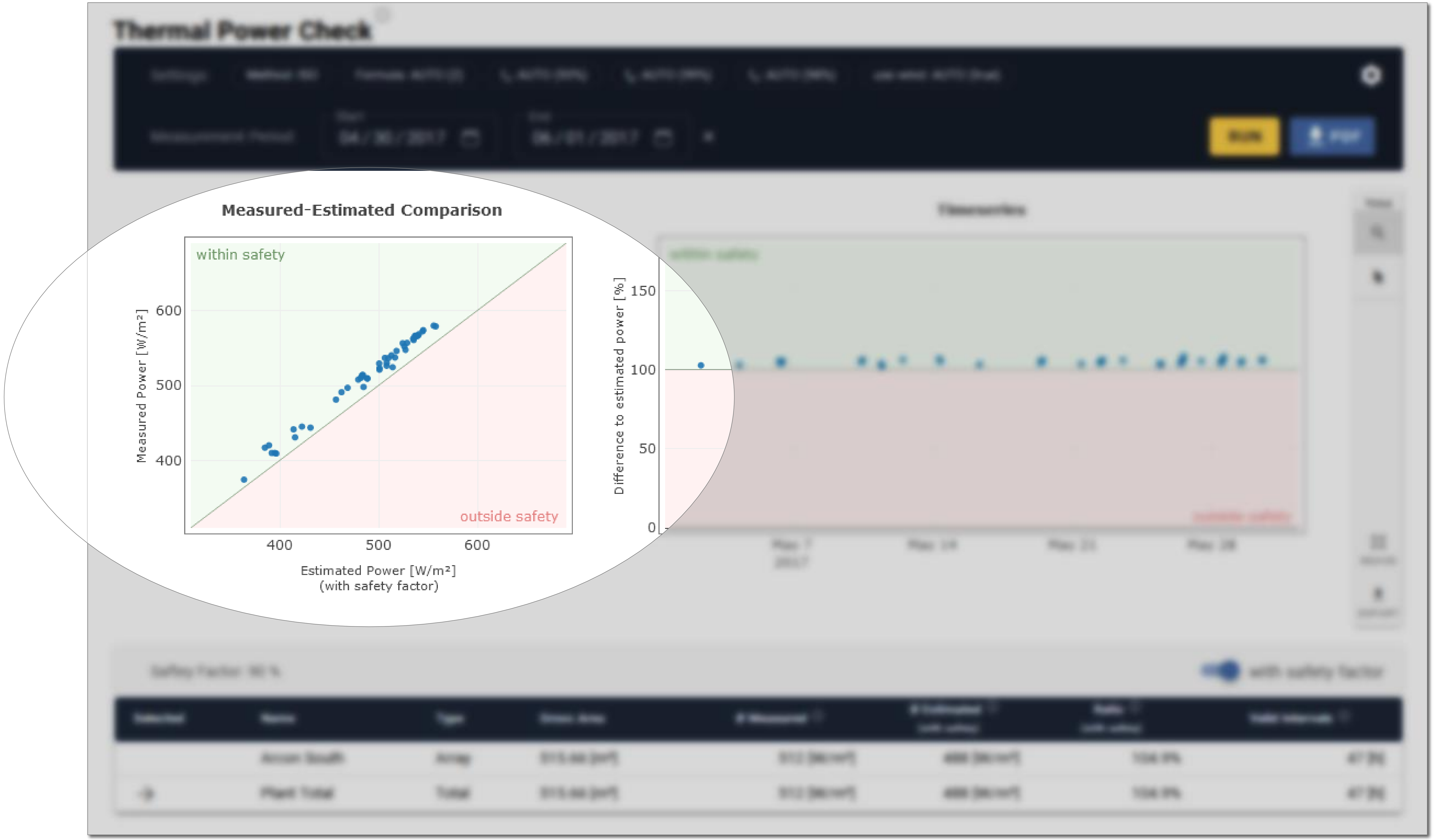
General information

Status : Published
Publication date : 2022-05
Stage : International Standard published [60.60]

Edition : 1
Number of pages : 30

Technical Committee : ISO/TC 180/SC 4
ICS : 27.160

SunPeek Power Check → ISO 24194



„Digital Tools for Solar Thermal Plant Monitoring“

A Handbook for Plant Operators and Associated Stakeholders

Digital Tools for Solar Thermal Plant Monitoring

A Handbook for Plant Operators and Associated Stakeholders

Version 1.0 (June 2024)

Authors

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Philip Ohnewein (AEE INTEC)
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Marnoch Hamilton-Jones (AEE INTEC)

Acknowledgements

This handbook was supported and made available by DIH (Digital Innovation Hub) Süd in collaboration with the Austrian Climate and Energy Fund (FFG 884622, DIH.03-23.AF.098-01). The authors would like to express their gratitude to the SunPeek developers for their valuable contributions to this work.

Citation (APA)

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Download:
https://doi.org/10.5281/zenodo.12523699

AEE INTEC

„Digital Tools“ Handbook

Download:
https://doi.org/10.5281/zenodo.12523699

Purpose

- Guide for plant operators & stakeholders to effectively *monitor solar thermal plants*.
- Focus is on solar *collector fields*, not single arrays.
- Overview of digital tools: *software, methods, datasets*.
- Focus on *open-source* tools & *open datasets*.

Acknowledgements

- Supported by DIH (Digital Innovation Hub) Süd
- Supported by Austrian Climate and Energy Fund
- Cooperation with team of SunPeek open-source software

„Digital Tools“ Handbook Contents

Download:
https://doi.org/10.5281/zenodo.12523699

Sensors
- Practical recommendations for monitoring
- Choice & placement of sensors

Data Gathering
- Sampling rate: at least 1 minute
- Time zones: explicit time zones, or UTC
- Timestamp format: ISO 8601
- Encoding: UTF-8

- **Data validation** tools & algorithms

„Digital Tools“ Handbook Contents

Download:
https://doi.org/10.5281/zenodo.12523699

- ISO 9806
- ISO 24194: Power Check, Daily Yield Check
- Most important Key Figures

„Digital Tools“ Handbook
Contents

Download:
https://doi.org/10.5281/zenodo.12523699

Solar thermal
- Software tools
- Open datasets

PV
- Software tools

General
- Weather & Irradiance tools, databases & APIs
- Visualization, Monitoring & IoT Platforms

→ “Speed Dating” → 4 selected tools

„Digital Tools“ Handbook Contents

Download:
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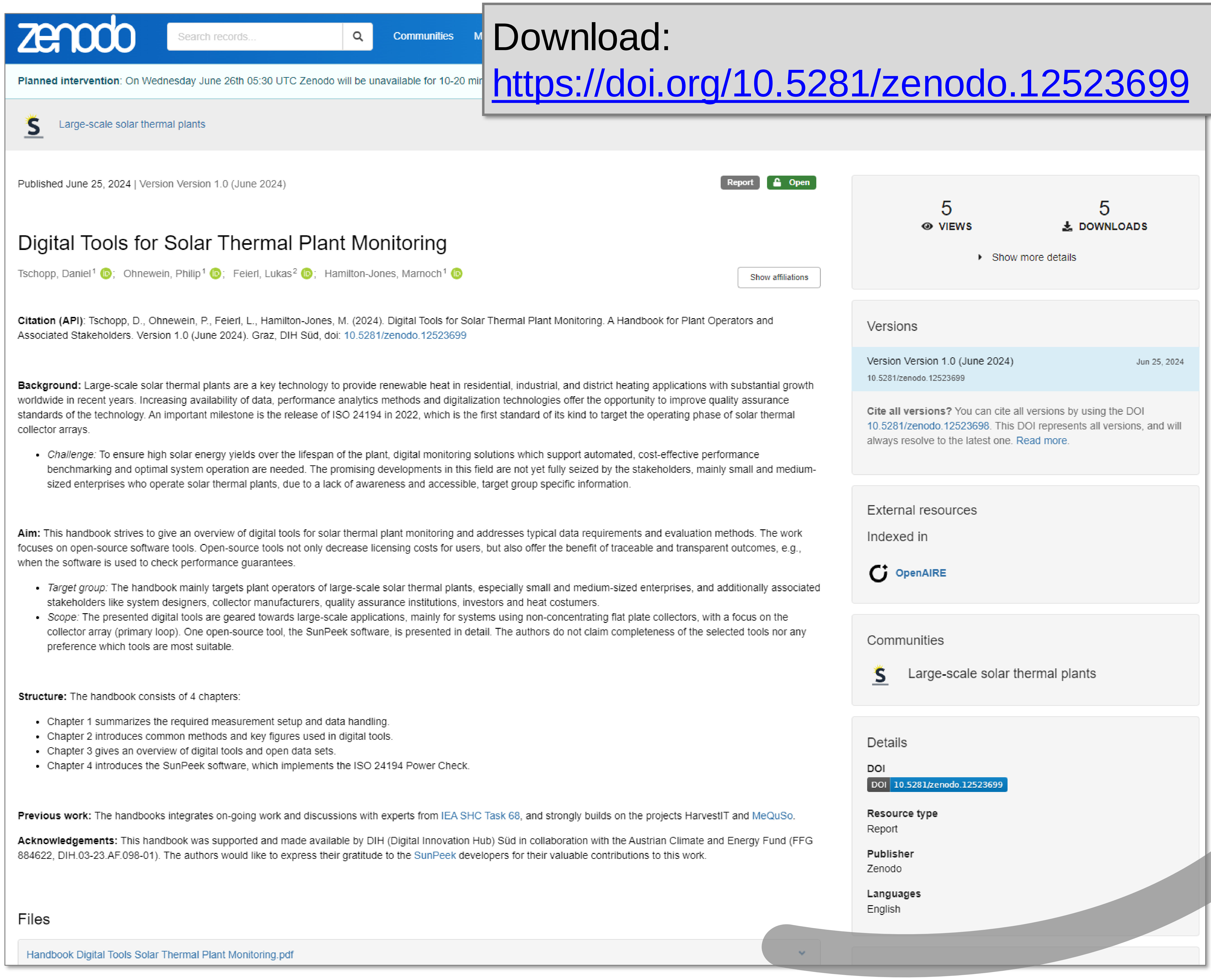
SunPeek Demo
- Later today

„Digital Tools for Solar Thermal Plant Monitoring"

A Handbook for Plant Operators and Associated Stakeholders



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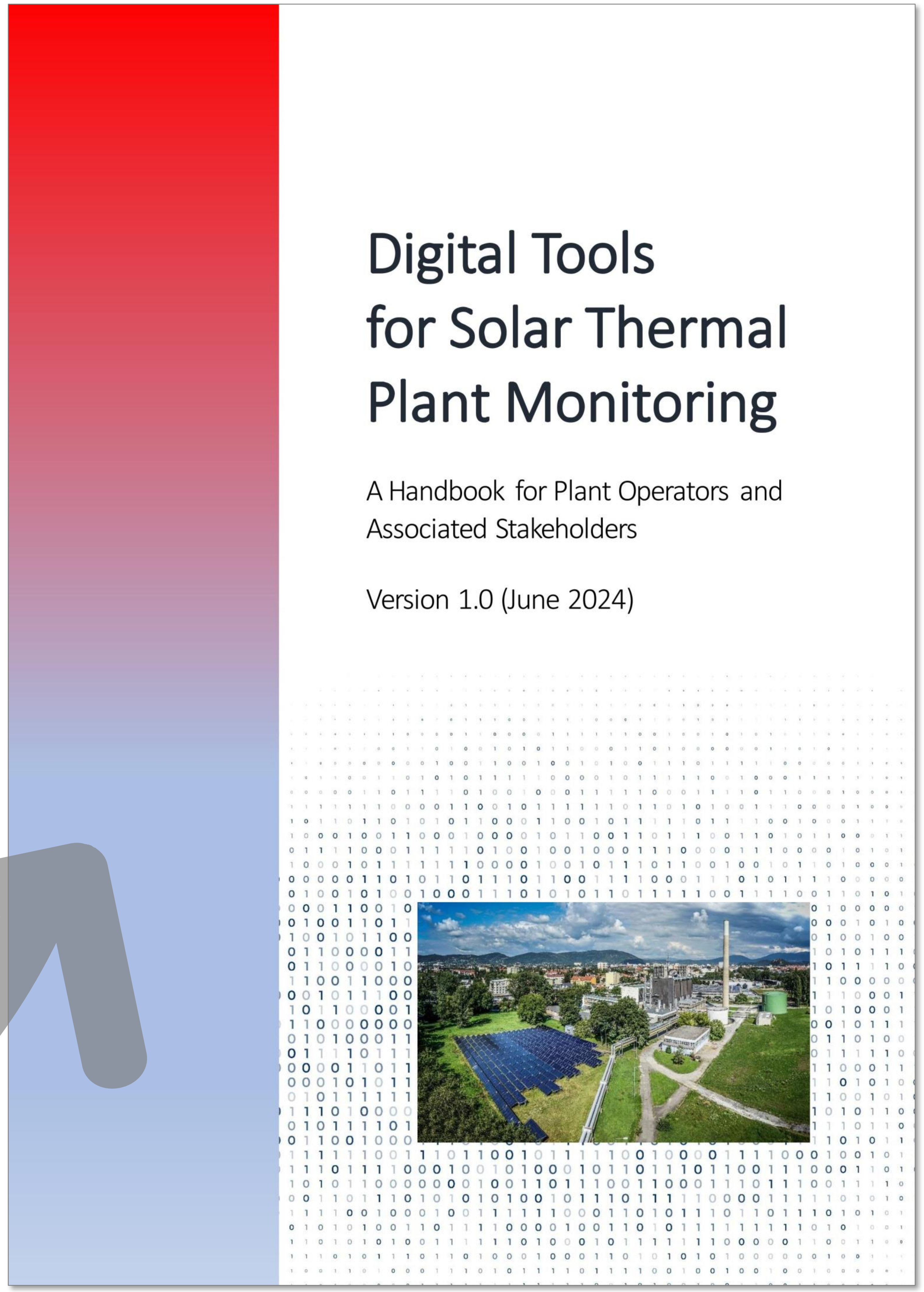

Speed Dating

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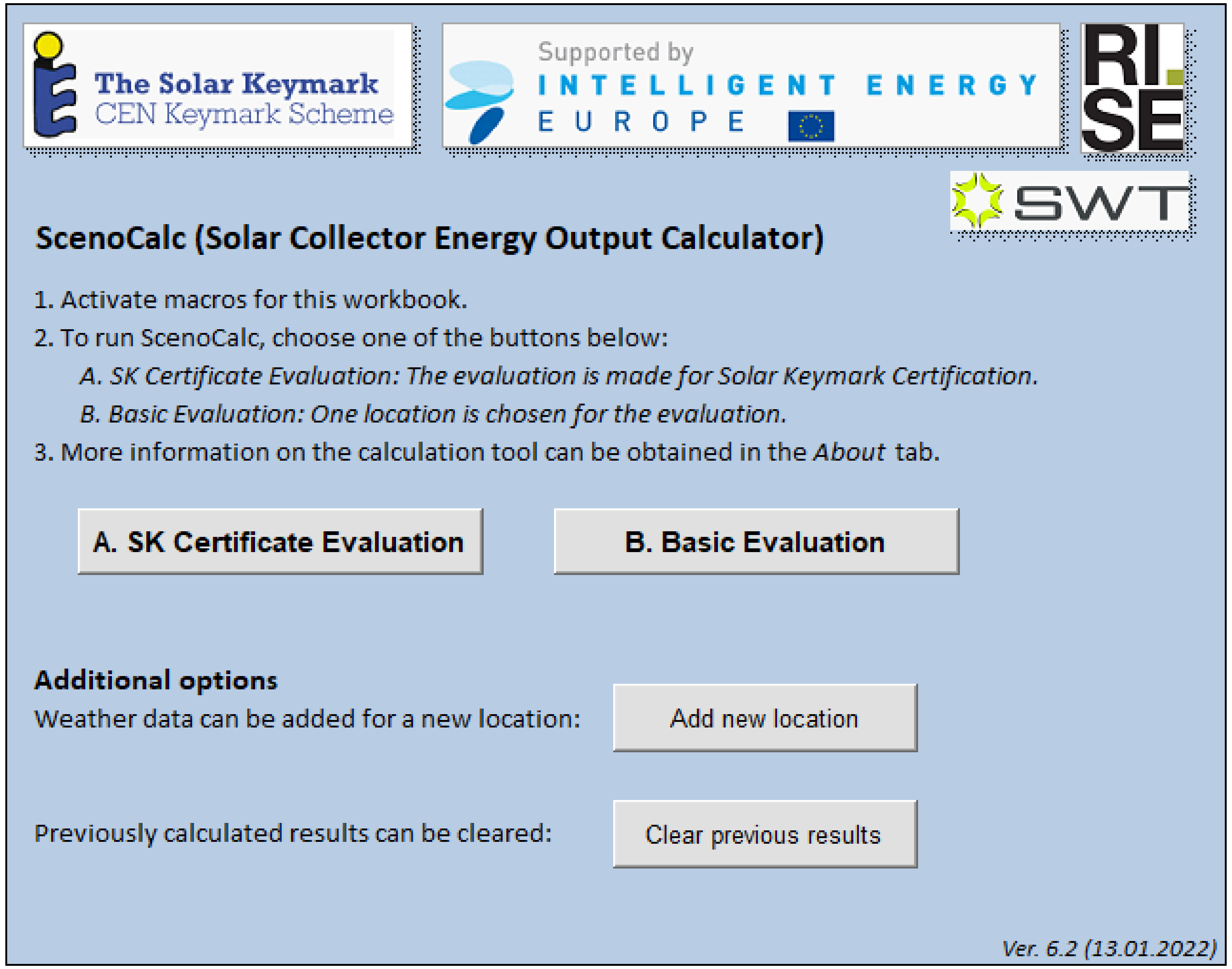
Selected Tools

ScenoCalc — The Solar Keymark CEN Keymark Scheme	https://solarkeymark.eu/calculation-tools/
SOLARHEATDATA.EU	https://solarheatdata.eu/
ThingsBoard	https://thingsboard.io/
pvlib	https://pvlib-python.readthedocs.io/en/stable/

SenoCalc

Official SolarKeymark calculation tool

- Download: https://solarkeymark.eu/calculation-tools/
- Excel file + VBA code
- Current version: 6.2



ScenoCalc

Official SolarKeymark calculation tool

Scope

- Calculates *annual solar yield* (kWh/m²$_{gr}$).
  Used in SolarKeymark datasheet, page 2.
  4 locations, and 3 temperature levels each.
- *Simplified assumptions* (hourly computation,
  load all the time, constant collector temperature, etc).
- Supports different collector orientations and tracking.
- Supports providing own location,
  collector parameters, and temperature levels.

Annex to Solar Keymark Certificate	Licence Number	011-7S2636 F
Supplementary Information	Issued	2016-04-06

Annual collector output in kWh/collector at mean fluid temperature ϑm, based on ISO 9806 Test Results

Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
TIGI HC1-A		2'201	1'808	1'455	1'812	1'473	1'179	1'306	1'019	788	1'406	1'096	838
Annual output per m² gross area		1'054	866	697	868	706	565	625	488	377	673	525	401
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
Mean annual ambient air temperature		18.5°C			3.2°C			7.5°C			9.0°C		
Collector orientation or tracking mode		South, 25°			South, 30°			South, 45°			South, 35°		

The collector is operated at constant temperature ϑm (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (July 2015). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

ScenoCalc

Annex to Solar Keymark Certificate Summary of EN ISO 9806 Test Results		Licence Number	011-7S2636 F
		Issued	2016-04-06
Collector test standard	**EN ISO 9806**		
Licence holder	TIGI LTD.	**Country**	Israel
Brand (optional)	--	**Web**	www.tigisolar.com
Street, Number	12 Modi-in St.	**E-mail**	info@tigisolar.com
Postcode, City	IL-4927161, Petah Tikva	**Tel**	+972 3 6353626
Collector Type		Evacuated tubular collector	

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector, Gb = 850 W/m²; Gd = 150 W/m², ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	130 K
	m²	mm	mm	mm	W	W	W	W	W	W
TIGI HC1-A	2.09	2'027	1'030	195	1'416	1'375	1'291	1'201	1'106	791
Power output per m² gross area					678	659	618	575	530	379

Performance parameters test method		Steady state - outdoor							
Performance parameters (related to AG)		η0,hem	a1	a2					
Units		-	W/(m²K)	W/(m²K²)					
Test results		0.678	1.900	0.003					
Incidence angle modifier test method		Steady state - outdoor							
Bi-directional incidence angle modifiers	Yes								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	0.99	0.98	0.96	0.93	0.88	0.78	0.65	0.38	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.98	0.95	0.89	0.80	0.65	0.40	0.00

Fluid for testing	Water-Glycole		
Flow rate for testing (per gross area, AG)	dm/dt	0.021	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	130	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	150	°C
Effective thermal capacity (per gross area, AG)	C/m^2	6.1	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	139	°C
Maximum operating pressure	$p_{max,op}$	800	kPa

Testing laboratory	SPF, CH-8640 Rapperswil	www.spf.ch	
Test report(s)	C1679LPEN C1679LPEN	**Dated**	31.03.2016 31.03.2016

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2636 F
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ScenoCalc

Official SolarKeymark calculation tool

Status

- Well-established and *accepted tool* in SolarKeymark & most of the European solar thermal world.
- Originally developed by *RISE 2019* in project QAIST.
- Supports a variety of collector types, but not yet PVT.
- Rework / Update planned (Pro-Sol-Netz project) towards supporting parabolic trough / *PTC and Fresnel* collectors.

Annex to Solar Keymark Certificate	Licence Number: 011-7S2636 F
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ScenoCalc & SunPeek

Similarities with SunPeek

- Both are based on *ISO 9806* standard / SolarKeymark.
- Both support a variety of *collector types* (flat plate, concentrating / tracking, air). Both aim at improving support for concentrating, PVT and other collector types.
- Both support *SST and QDT* collector data sheets

Differences to SunPeek

- SunPeek is a *performance monitoring* tool for plants in operation. ScenoCalc is a *yield estimation* tool, converting collector parameters into a projected solar energy yield.
- SunPeek processes in-situ *measurement data* from solar thermal plants. ScenoCalc does not, it's not a monitoring tool.
- ScenoCalc is not backed by an *open-source* project. Maintenance and Governance are somewhat undefined.

SunPeek

The Solar Keymark
CEN Keymark Scheme

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pvlib

From: https://pvlib-python.readthedocs.io/en/stable/
Anderson, K., Hansen, C., Holmgren, W., Jensen, A., Mikofski, M., and Driesse, A. “pvlib python: 2023 project update.” Journal of Open Source Software, 8(92), 5994, (2023). DOI: 10.21105/joss.05994.

SunPeek

pvlib

*pvlib **python** is a community developed toolbox that provides a set of functions and classes for **simulating the performance of photovoltaic energy systems** and accomplishing related tasks.*

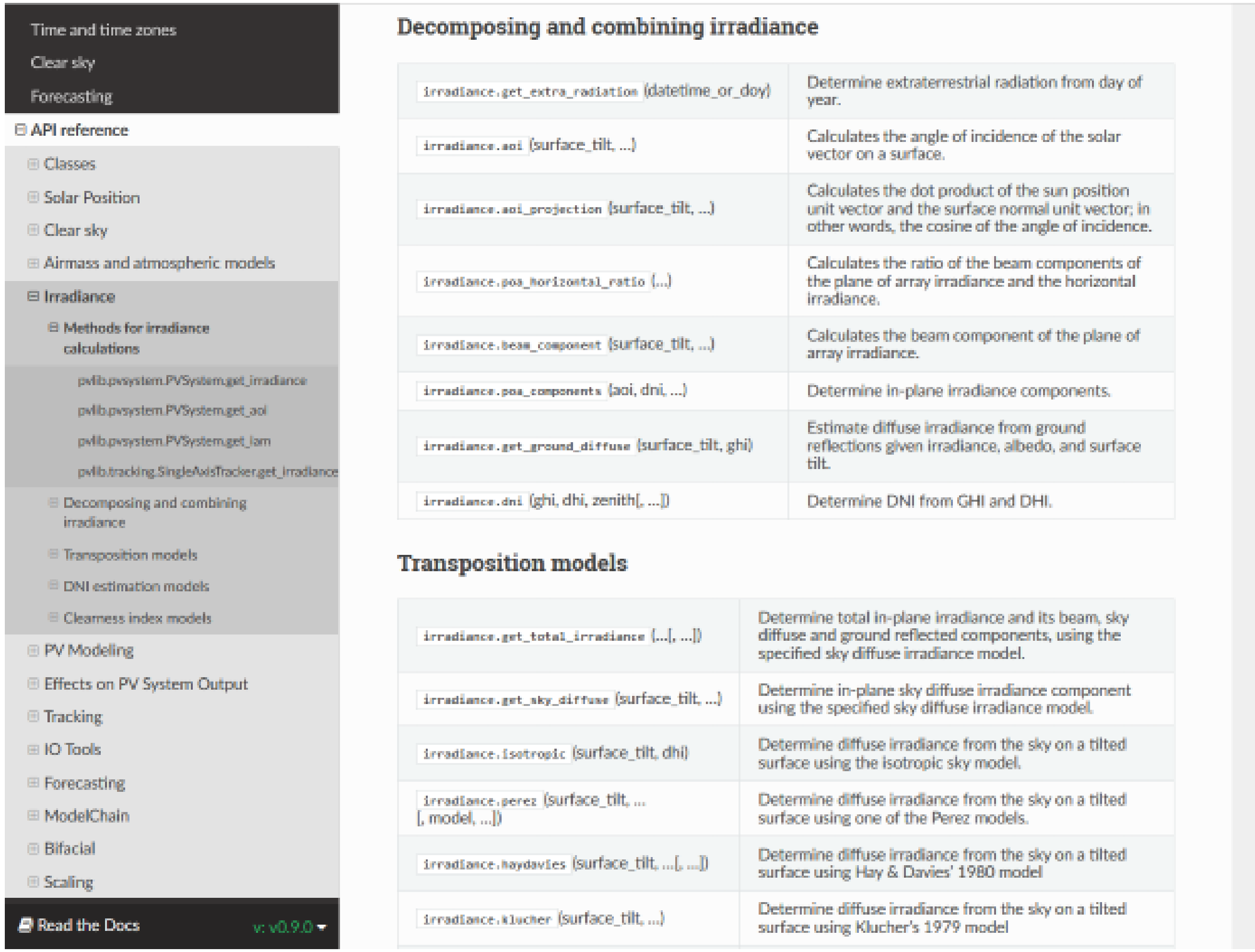
pvlib

*pvlib **python** is a community developed toolbox that provides a set of functions and classes for **simulating the performance of photovoltaic energy systems** and accomplishing related tasks.*

⇒ PV and solar-thermal share **irradiation calculations** (incl. Tracking)

⇒ PV and solar-thermal need to handle **sensor and measurement data** (PVAnalytics)

Examples



Time and time zones
Clear sky
Forecasting
⊟ API reference
⊞ Classes
⊞ Solar Position
⊞ Clear sky
⊞ Airmass and atmospheric models
⊟ Irradiance
⊟ Methods for irradiance calculations
pvlib.pvsystem.PVSystem.get_irradiance
pvlib.pvsystem.PVSystem.get_aoi
pvlib.pvsystem.PVSystem.get_iam
pvlib.tracking.SingleAxisTracker.get_irradiance
⊞ Decomposing and combining irradiance
⊞ Transposition models
⊞ DNI estimation models
⊞ Clearness index models
⊞ PV Modeling
⊞ Effects on PV System Output
⊞ Tracking
⊞ IO Tools
⊞ Forecasting
⊞ ModelChain
⊞ Bifacial
⊞ Scaling
Read the Docs v: v0.9.0

Decomposing and combining irradiance

`irradiance.get_extra_radiation` (datetime_or_doy)	Determine extraterrestrial radiation from day of year.
`irradiance.aoi` (surface_tilt, ...)	Calculates the angle of incidence of the solar vector on a surface.
`irradiance.aoi_projection` (surface_tilt, ...)	Calculates the dot product of the sun position unit vector and the surface normal unit vector; in other words, the cosine of the angle of incidence.
`irradiance.poa_horizontal_ratio` (...)	Calculates the ratio of the beam components of the plane of array irradiance and the horizontal irradiance.
`irradiance.beam_component` (surface_tilt, ...)	Calculates the beam component of the plane of array irradiance.
`irradiance.poa_components` (aoi, dni, ...)	Determine in-plane irradiance components.
`irradiance.get_ground_diffuse` (surface_tilt, ghi)	Estimate diffuse irradiance from ground reflections given irradiance, albedo, and surface tilt.
`irradiance.dni` (ghi, dhi, zenith[, ...])	Determine DNI from GHI and DHI.

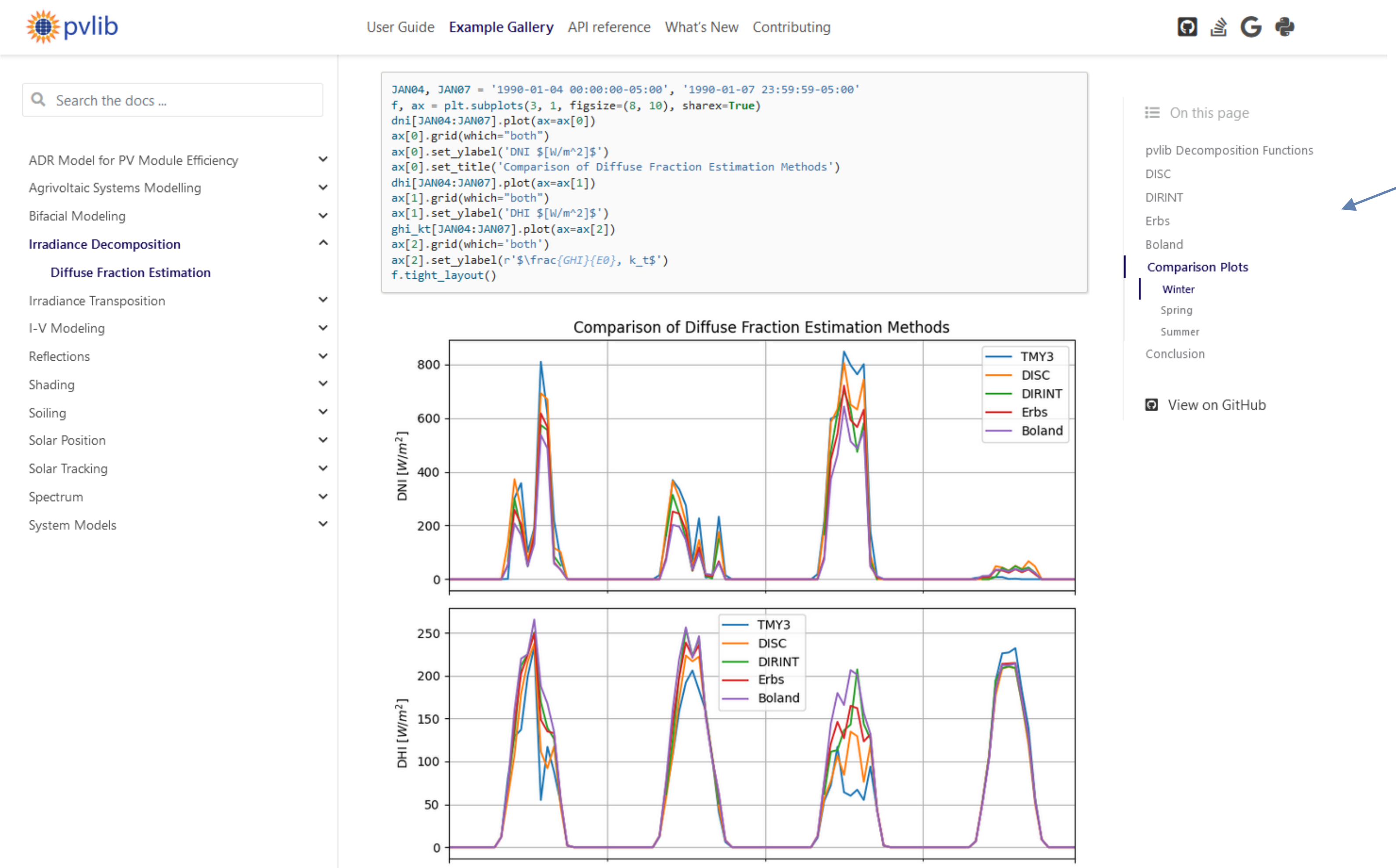
Transposition models

`irradiance.get_total_irradiance` (...[, ...])	Determine total in-plane irradiance and its beam, sky diffuse and ground reflected components, using the specified sky diffuse irradiance model.
`irradiance.get_sky_diffuse` (surface_tilt, ...)	Determine in-plane sky diffuse irradiance component using the specified sky diffuse irradiance model.
`irradiance.isotropic` (surface_tilt, dhi)	Determine diffuse irradiance from the sky on a tilted surface using the isotropic sky model.
`irradiance.perez` (surface_tilt, ...[, model, ...])	Determine diffuse irradiance from the sky on a tilted surface using one of the Perez models.
`irradiance.haydavies` (surface_tilt, ...[, ...])	Determine diffuse irradiance from the sky on a tilted surface using Hay & Davies' 1980 model
`irradiance.klucher` (surface_tilt, ...)	Determine diffuse irradiance from the sky on a tilted surface using Klucher's 1979 model

Many calculations regarding irradiance (AOI, extraterrestrial irradiation, solar time, decompositions, etc.)

Link: https://pvlib-python.readthedocs.io/en/v0.9.0/api.html#methods-for-irradiance-calculations

Examples

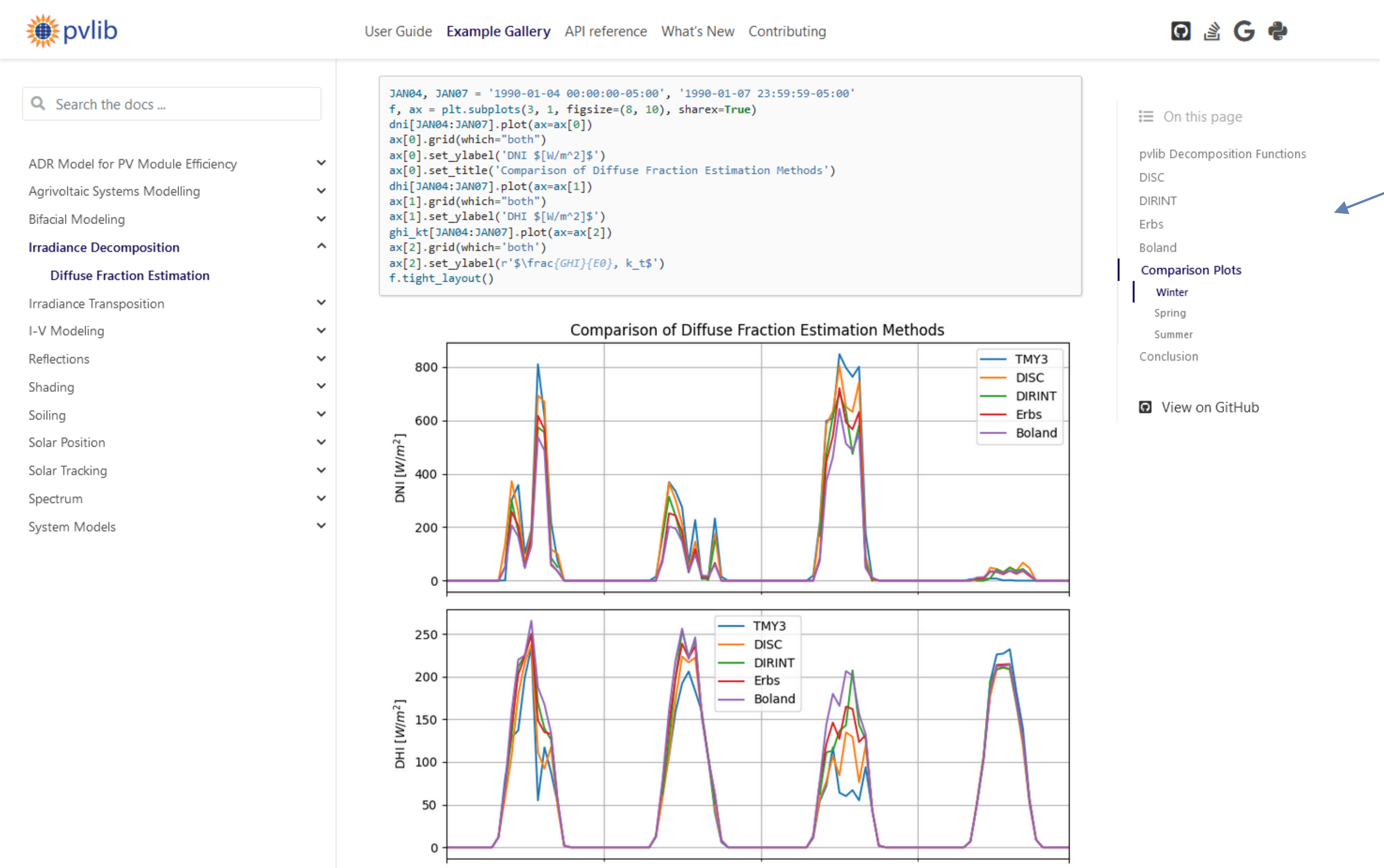


Including nice code examples:
Estimate diffuse irradiation based on different estimation models

Link: https://pvlib-python.readthedocs.io/en/stable/gallery/irradiance-decomposition/plot_diffuse_fraction.html#

Examples

SunPeek



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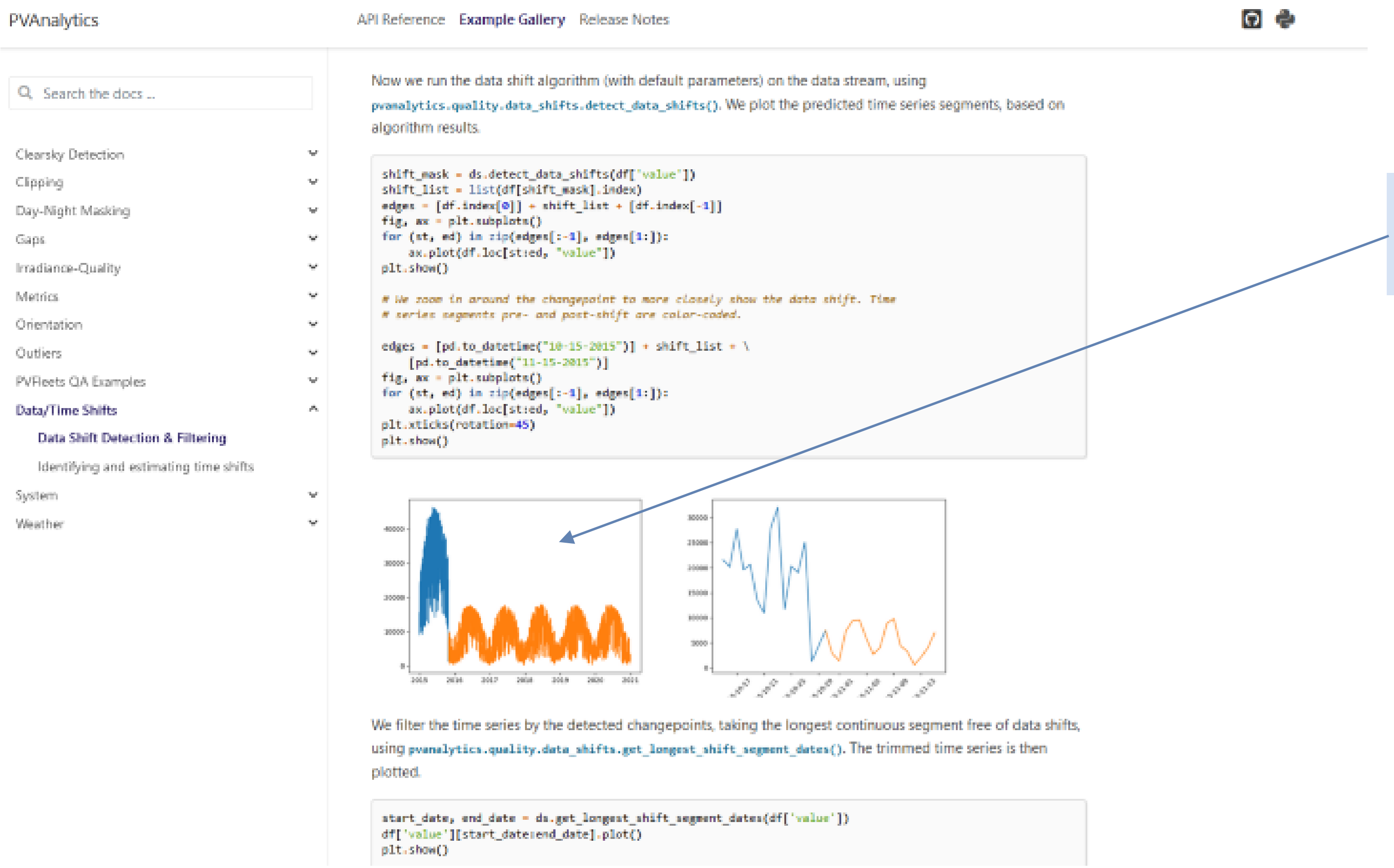
Examples



PVAnalytics

API Reference Example Gallery Release Notes

Search the docs ...

- Clearsky Detection
- Clipping
- Day-Night Masking
- Gaps
- Irradiance-Quality
- Metrics
- Orientation
- Outliers
- PVFleets QA Examples
- Data/Time Shifts
  - Data Shift Detection & Filtering
  - Identifying and estimating time shifts
- System
- Weather

Now we run the data shift algorithm (with default parameters) on the data stream, using `pvanalytics.quality.data_shifts.detect_data_shifts()`. We plot the predicted time series segments, based on algorithm results.

```
shift_mask = ds.detect_data_shifts(df['value'])
shift_list = list(df[shift_mask].index)
edges = [df.index[0]] + shift_list + [df.index[-1]]
fig, ax = plt.subplots()
for (st, ed) in zip(edges[:-1], edges[1:]):
    ax.plot(df.loc[st:ed, "value"])
plt.show()

# We zoom in around the changepoint to more closely show the data shift. Time
# series segments pre- and post-shift are color-coded.

edges = [pd.to_datetime("10-15-2015")] + shift_list + \
    [pd.to_datetime("11-15-2015")]
fig, ax = plt.subplots()
for (st, ed) in zip(edges[:-1], edges[1:]):
    ax.plot(df.loc[st:ed, "value"])
plt.xticks(rotation=45)
plt.show()
```

We filter the time series by the detected changepoints, taking the longest continuous segment free of data shifts, using `pvanalytics.quality.data_shifts.get_longest_shift_segment_dates()`. The trimmed time series is then plotted.

```
start_date, end_date = ds.get_longest_shift_segment_dates(df['value'])
df['value'][start_date:end_date].plot()
plt.show()
```

Identify shifts in measurement data (PVAnalytics)

Link:
https://pvanalytics.readthedocs.io/en/stable/generated/gallery/shifts/data-shifts.html

Summary

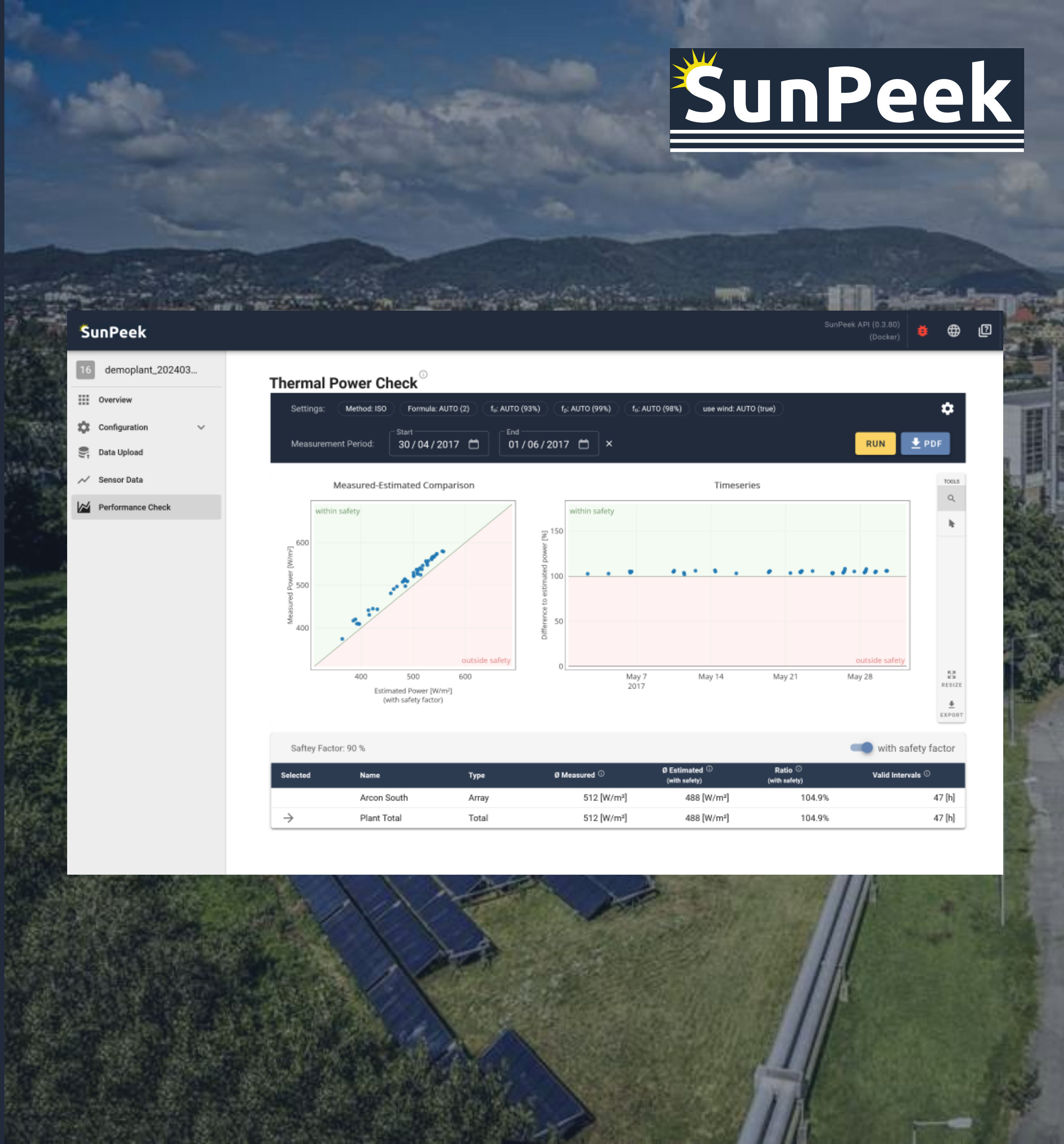
- Open Source Python project
  - ⇒ Role model for SunPeek
  - ⇒ Used for some calculations

- Many functions that can be used for solar-thermal:
  (even though developed for PV)

  - Irradiation & irradiation conversion (pvlib)
  - Fetching weather data (pvlib)
  - Plausibility checks (PVAnalytics)

SunPeek

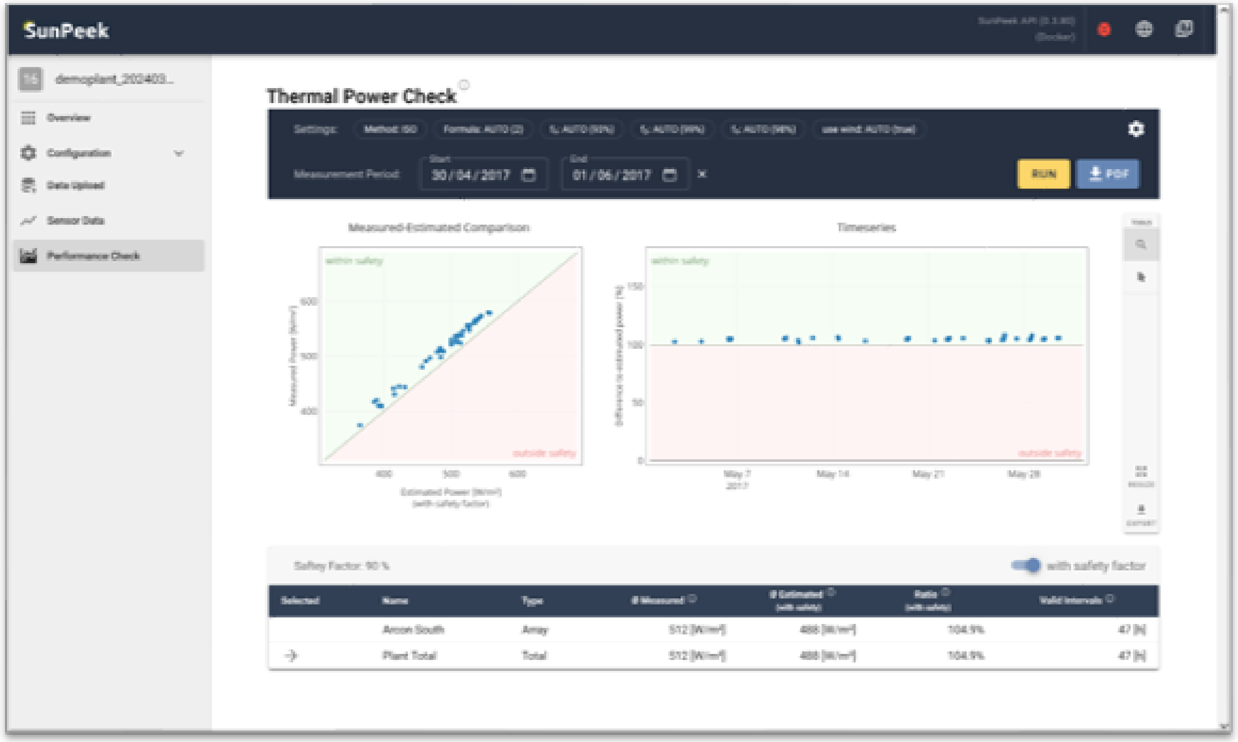
Demo



What is SunPeek?

> SunPeek is the quasi-standard to apply the ISO 24194

Free and easy to use!



Usage of SunPeek

Collector Guarantees

Does the collector perform as specified?

Performance Monitoring

How does collector performance changes over time?

Images ©SOLID Solar Energy Systems

How does it work?

SunPeek

ISO 24194 – Power Check compares array performance:

Actual performance	**Estimated** performance
Based on measurements: $\dot{Q} = c_p \dot{m}(v_{out} - v_{in})$	Based on Collector-Keymark-Equation: $\dot{Q} = A_{GF} \cdot \left[\eta_{0,hem}\, K_{hem}(\theta)\, G_{hem} - a_1(\vartheta_m - \vartheta_a) - a_2(\vartheta_m - \vartheta_a)^2 - a_5\left(\frac{d\vartheta_m}{dt}\right)\right] \cdot f_{safe}$
1h averages	1h averages

Compare only for valid timestamps
(operation conditions close to stable full power operation)

How does it work?

Actual
performance

Estimated
performance

Actual power is **higher** than estimated power (above diagonal)

Actual power is **lower** than estimated power (below diagonal)

Why open-source?

SunPeek

✓ **Accessibility**
Implementing the ISO needs considerable knowledge and ressources.
With SunPeek, the method is accessible to everyone without any work

✓ **Transparency**
Guarantees must be transparent, so all parties can check the results independently.
With SunPeek, everyone works with the

✓ **Consistency**
Results must be consistent and truthful to the ISO.
With SunPeek, everyone relies on the same code.

Software & Licenses

SunPeek

web UI
Graphical user interface.
Interactive use in browser.

web API
Restful API. Automate with other software tools.

Python package
Algorithm development.
Integrate with other projects.

Docker
Standardized distribution and installation.

BSD-3 Clause

- „Permissive“, virtually no restrictions
- Used in similar open-source projects (e.g. pvlib).
- Simplifies integration with own software.

open source initiative Approved License®

Summary

✓ SunPeek is **free** to use, also **commercially**, free to modify and distribute.

✓ **Open Data is optional**. No need to share measurement data!

- **Backend: LGPL (GNU General Public License)**
  - „Weakly Protective“
  - Must release changes under same license.
  - Ensures *consistent implementation* of ISO 24194.

open source initiative Approved License®

SunPeek Information

✓	**Support**	support@sunpeek.org
✓	**Software Repository**	https://gitlab.com/sunpeek/
✓	**Public Demo**	https://demo.sunpeek.org/

✓	**Open Dataset**	https://doi.org/10.5281/zenodo.7741083
✓	**Data-in-Brief Article**	https://doi.org/10.1016/j.dib.2023.109224
✓	**Zenodo Community**	https://zenodo.org/communities/sunpeek

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

SunPeek

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

SunPeek Demo Server

https://demo.sunpeek.org/

SunPeek

Next Steps & Activities

Activities

2024

2025

Activities

SunPeek

Improve **Documentation**

Syncing with **Solar Keymark Database**

Support for **Vacuum Tube Collectors**

Faster by **storing PC-results**

Enable **cloud solutions**

Automation
(e.g., reporting, data upload)

Support for less common **plant setups**

Alpha Version

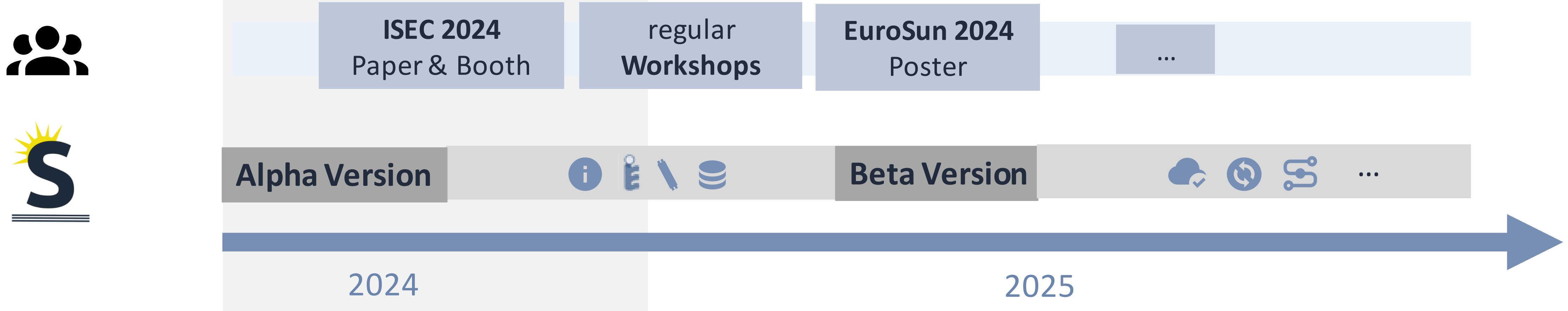
Beta Version

...

2024

2025

Activities


ISEC 2024
Paper & Booth
regular
Workshops
EuroSun 2024
Poster
...
Alpha Version
Beta Version
...
2024
2025

Activities

Task 68 – Guide to ISO 24194

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2024

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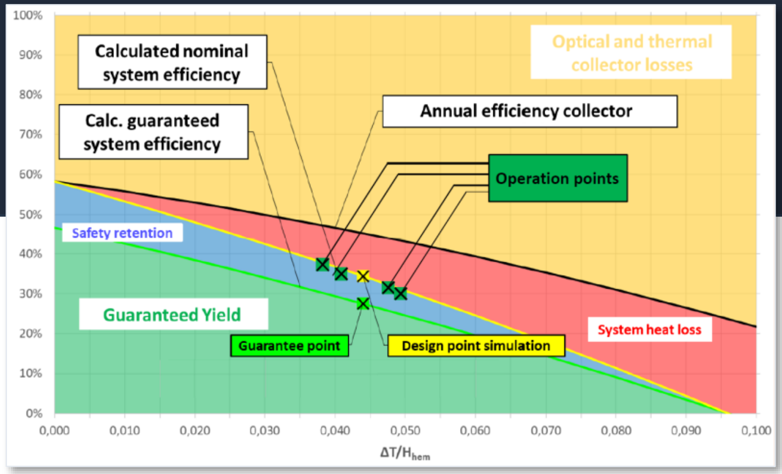
Activities

SunPeek



ISO

TC180 – Update to ISO 24194 – Annual Yield Check

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Activities

SunPeek

Applied CPS (AEE-Intec) for SunPeek Support

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...

2024

2025

What does that mean for you?

- **You want to try SunPeek?**
  Sure, just go to https://demo.sunpeek.org or download the software for free!

- **You want support setting up your plant?**
  Contact us! We will help you set up your plant as part of the Applied CPS funding.

- **You want to join the SunPeek community?**
  Stay connected and stay tuned for further workshops!
  We are also always looking for contributors to join us!

- **You want to join the ISO 24194 discussions?**
  Contact us! We are happy to include you in the Task 68 work and discussions

SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

Join us!

Be a part of the SunPeek and let‘s work together for a brighter solar-thermal future

www.sunpeek.org

sunpeek@sunpeek.org