AEE INTEC

HarvestIT

Open innovation and open source development of an advanced monitoring solution for large-scale solar thermal plants

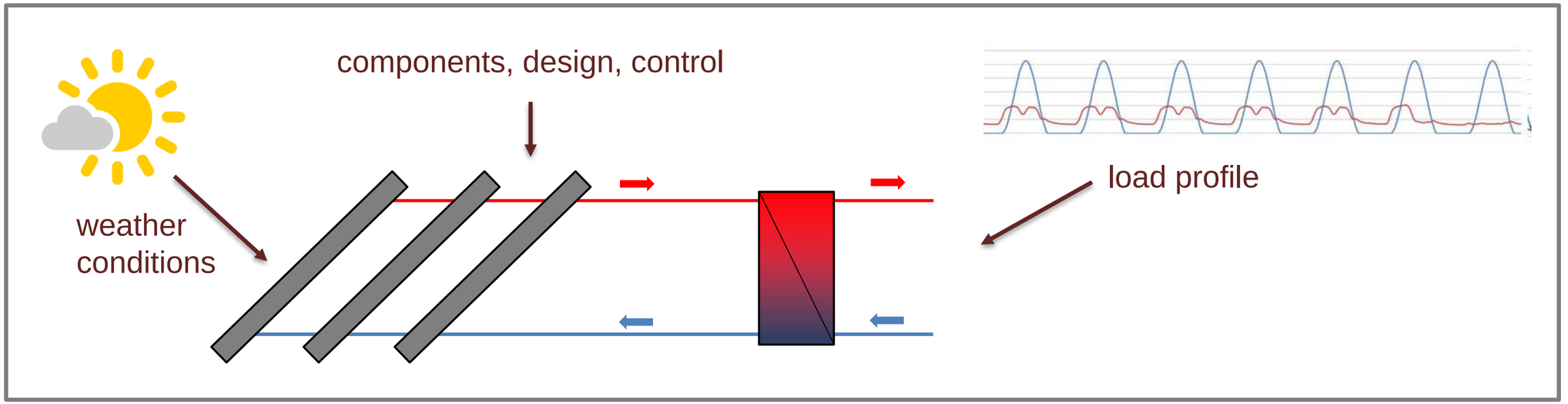
Philip Ohnewein, Daniel Tschopp
and HarvestIT project team

HarvestIT: Open innovation and **open source** development of an advanced **monitoring** solution for large-scale solar thermal plants

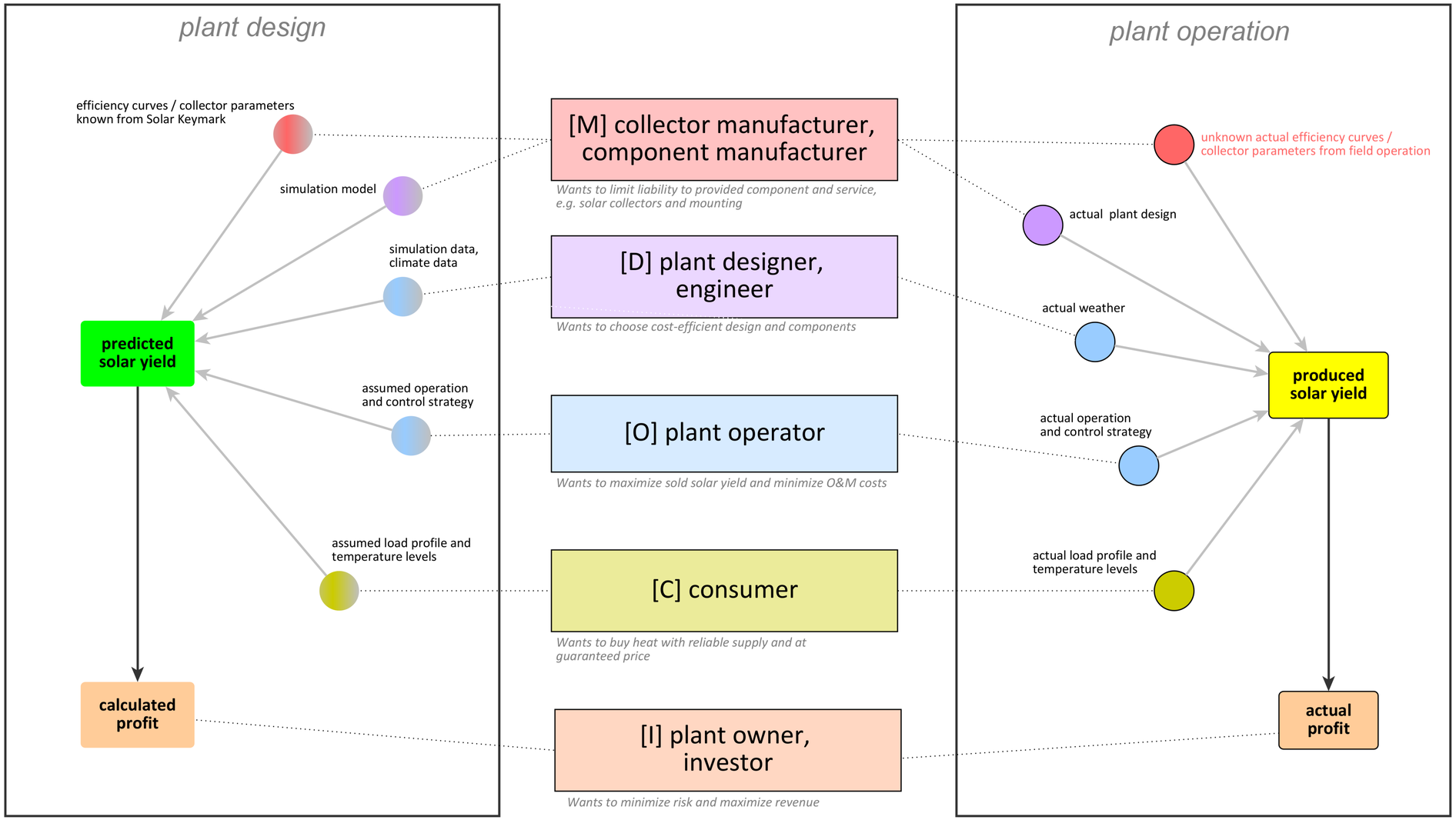
Source: Picfly.at Thomas Eberhard

Background and Need

- Plants have high initial investment costs, long amortization periods.
- Consistently high solar yield / good plant performance is essential.
- Performance assessment is difficult, even for experts.
- More and more data is collected, we should make use of it!
- On the market:
  - No dynamic in-situ test procedure.
  - No common standard evaluation software for power & yield guarantees.



Solar yield guarantees: Who is responsible for what?



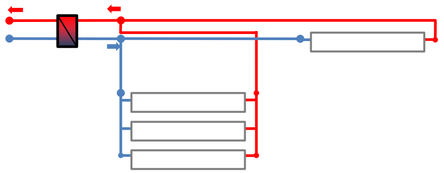
Project HarvestIT

- **HarvestIT:** Advanced monitoring of large-scale solar thermal plants with open-source software solution
- Funding call: FFG – FastTrackDigital 1st Call
- Project duration: 2021-11 to 2023-10

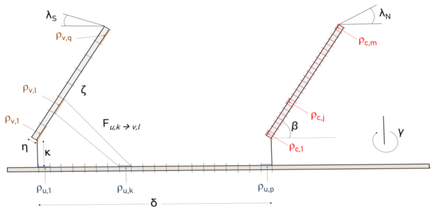
The vision: Create an **open source** monitoring software

Easy to apply. Based on current scientific findings.

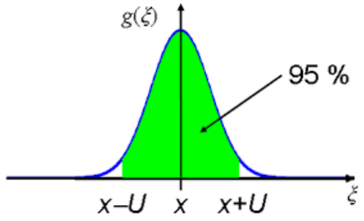
Collector array modeling

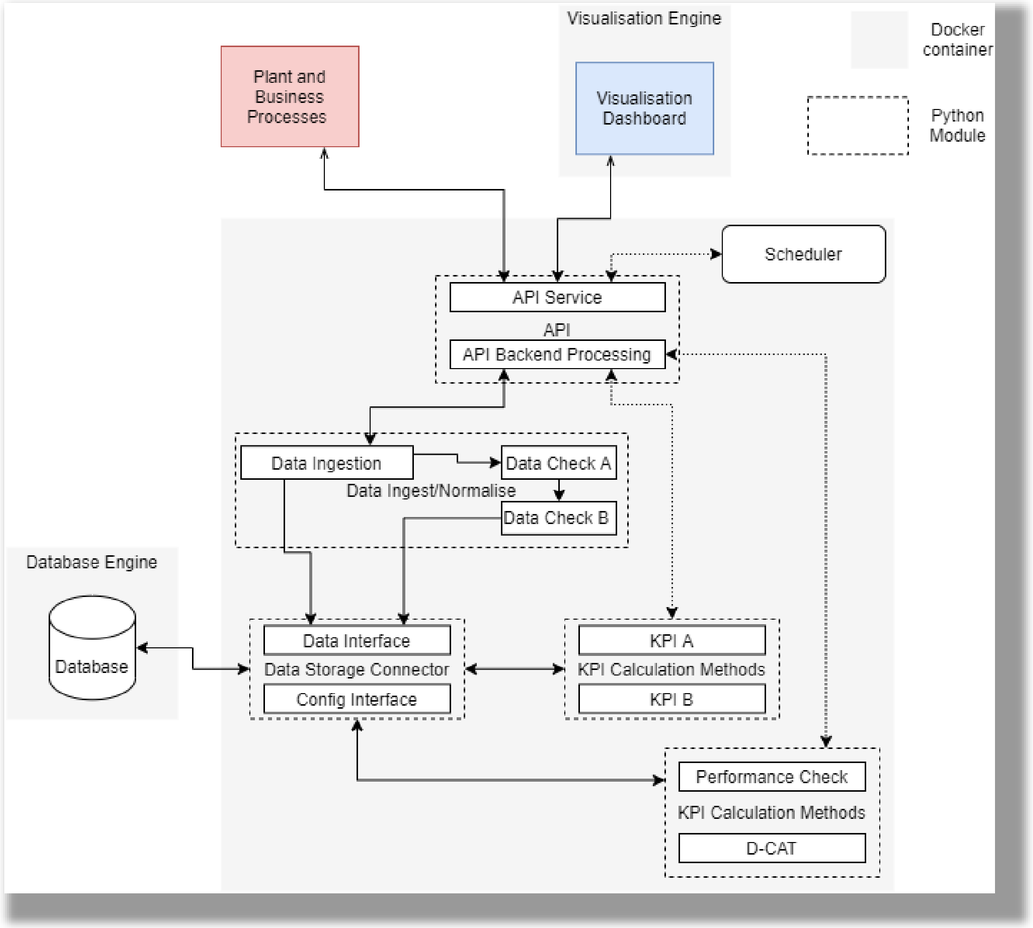


Radiation modeling



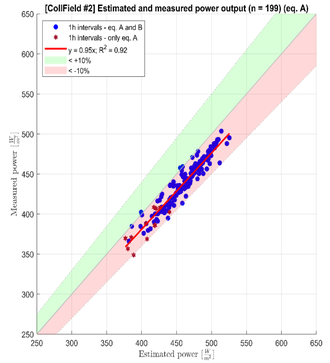
Mesurement uncertainty & error propagation

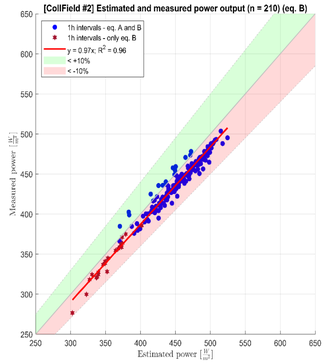




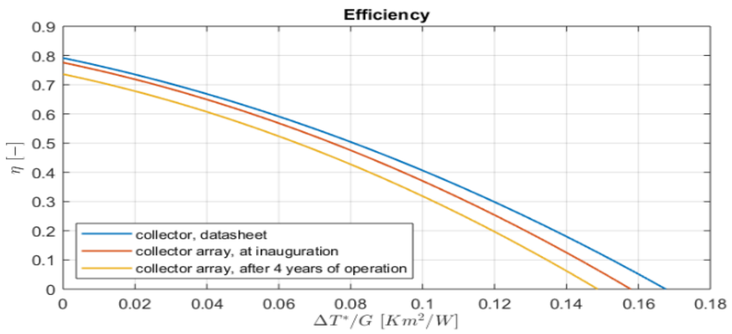
GitHub

Perfomance Check (PC)





Dynamic Collector Array Test (D-CAT)



From paper to implementation

DRAFT ISO/DIS 24194 Solar energy — Collector fields — Check of performance

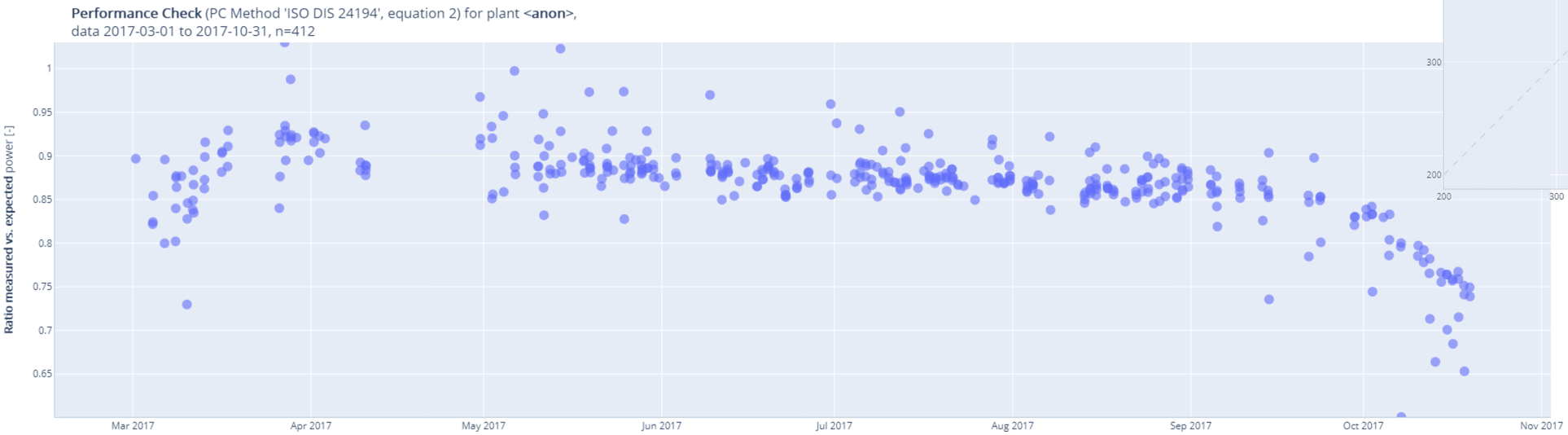
DRAFT INTERNATIONAL STANDARD

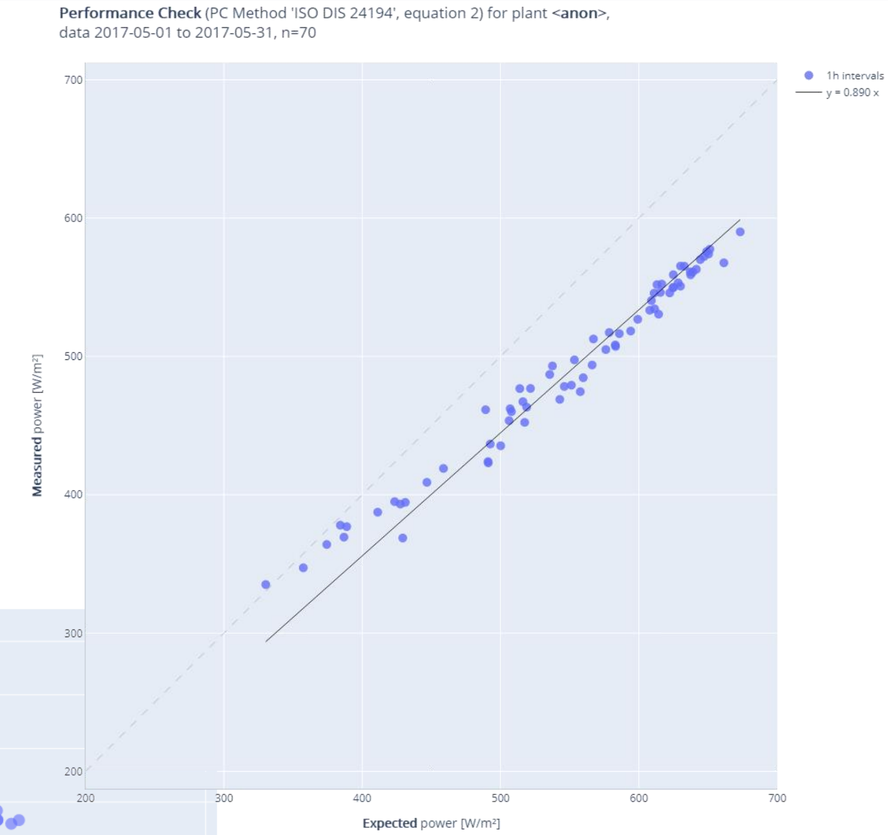
ISO/DIS 24194

ISO/TC **180**/SC **4** Secretariat: **SAC**

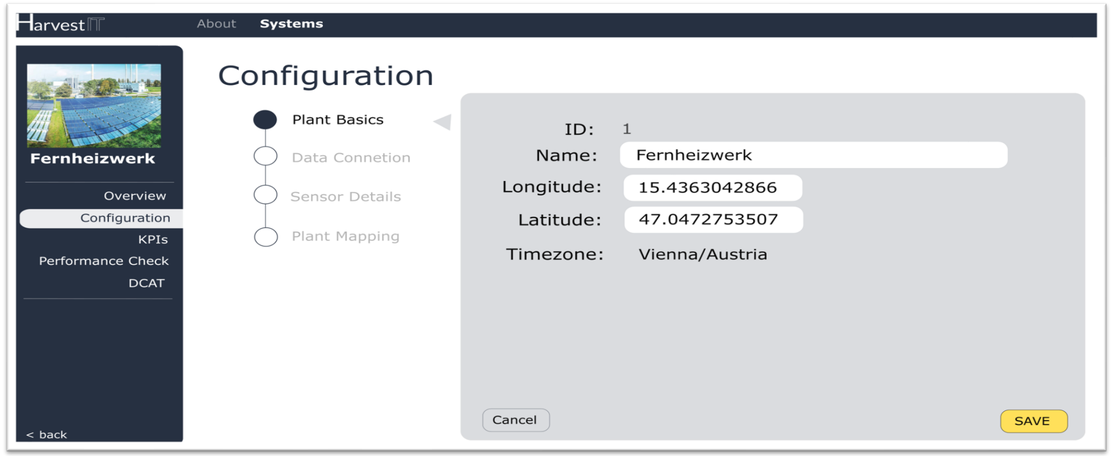
Voting begins on: **2021-04-14** Voting terminates on: **2021-07-07**

Solar energy — Collector fields — Check of performance





The vision


HarvestIT
About
Systems
Fernheizwerk
Overview
Configuration
KPIs
Performance Check
DCAT
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Configuration
Plant Basics
Data Connetion
Sensor Details
Plant Mapping
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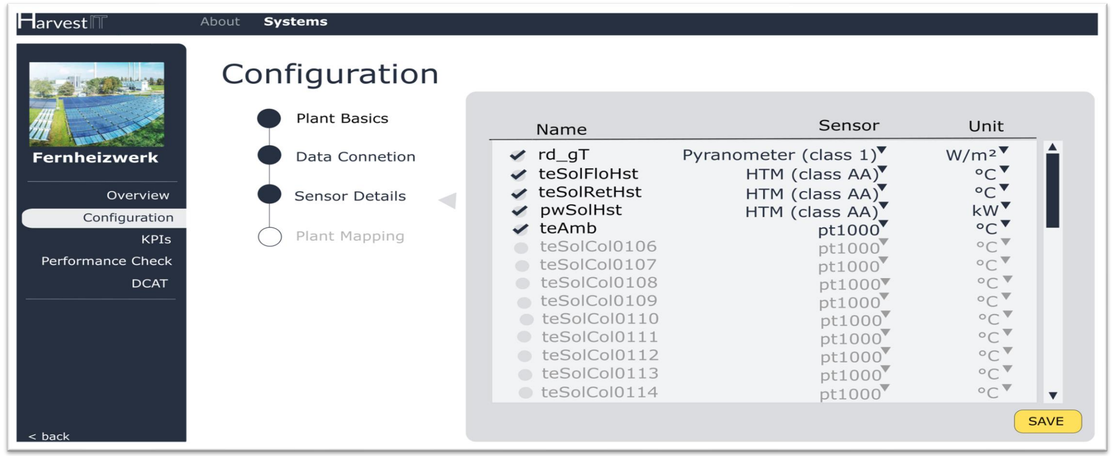
SAVE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Overview
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DCAT
< back
Configuration
Plant Basics
Data Connetion
Sensor Details
Plant Mapping
Name
Sensor
Unit
rd_gT Pyranometer (class 1) W/m²
teSolFloHst HTM (class AA) °C
teSolRetHst HTM (class AA) °C
pwSolHst HTM (class AA) kW
teAmb pt1000 °C
teSolCol0106 pt1000 °C
teSolCol0107 pt1000 °C
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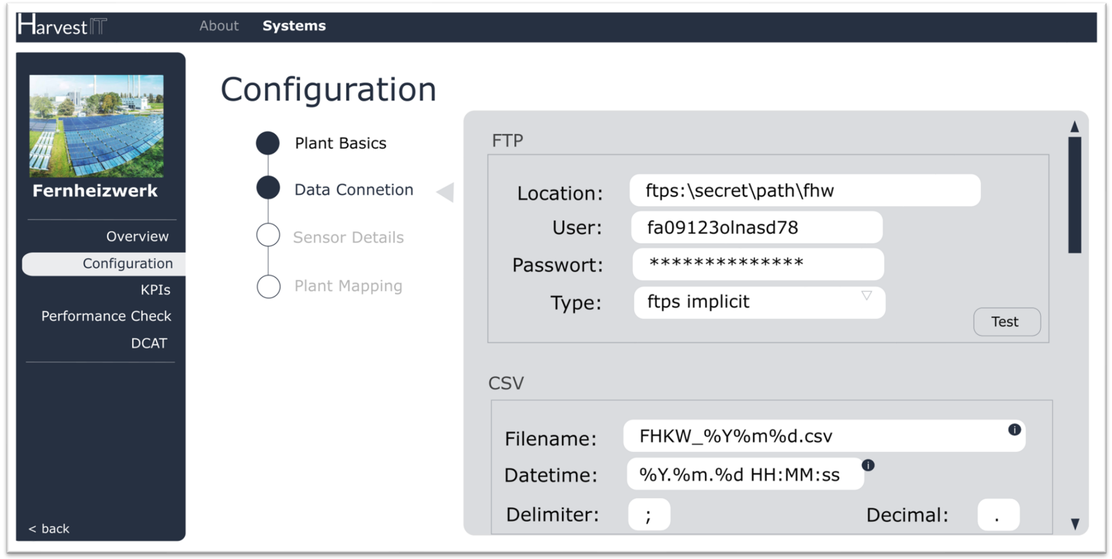
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< back
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Data Connetion
Sensor Details
Plant Mapping
FTP
Location: ftps:\secret\path\fhw
User: fa09123olnasd78
Passwort: **********
Type: ftps implicit
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CSV
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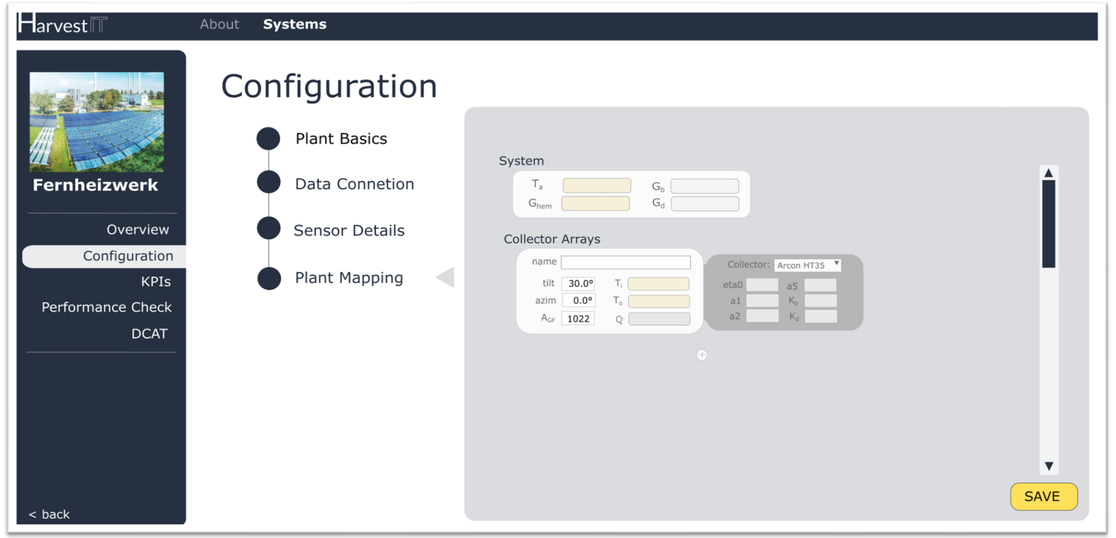
Datetime: %Y.%m.%d HH:MM:ss
Delimiter: ;
Decimal: .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Performance Check
DCAT
< back
Configuration
Plant Basics
Data Connetion
Sensor Details
Plant Mapping
System
Collector Arrays
name
tilt 30.0°
azim 0.0°
Collector: Arcon HT35
SAVE

Open innovation and open source

Development

Phase I
wihtin consoritum
Basic building blocks, structure
ongoing

Phase II
public repository
Refinement, new modules, new algorithms
~autumn 2022

Phase III
public repository
Early Adopters
~spring 2023

Phase IV
public repository
Open Source Deployment
10/2023

Open Innovation

OI Campaign
Operational *Problems (DE)*
01/2022 - 03/2022

Questionnaire on monitoring tools
04/2022

OI Campaign
Large solar thermal plants:
Monitoring tools and key figures (EN)
04/2022

Participation form

Advanced monitoring of large-scale solar thermal plants with open-source software solution (www.collector-array-test.org)

First name	Last name	E-mail	I'm interested in…			
			Open innovation campaign "Monitoring tools and key figures"	Participation in software development process	Testing the tool as an early adopter	Project updates, publications, download link of tool releases
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐

How to participate?

Questionnaire **on monitoring tools**	https://www.menti.com/ enter code **7860 0069**
Open Innovation Campaign **“Large solar thermal plants: Monitoring tools and key figures”**	Fill out form or write to d.tschopp@aee.at
Development Phase II – IV **starting ~autumn 2022**	
HarvestIT Project updates **Any feedback welcome**	https://www.collector-array-test.org/

Open Innovation Campaign

Open 4 weeks from now: → 2022-04-30

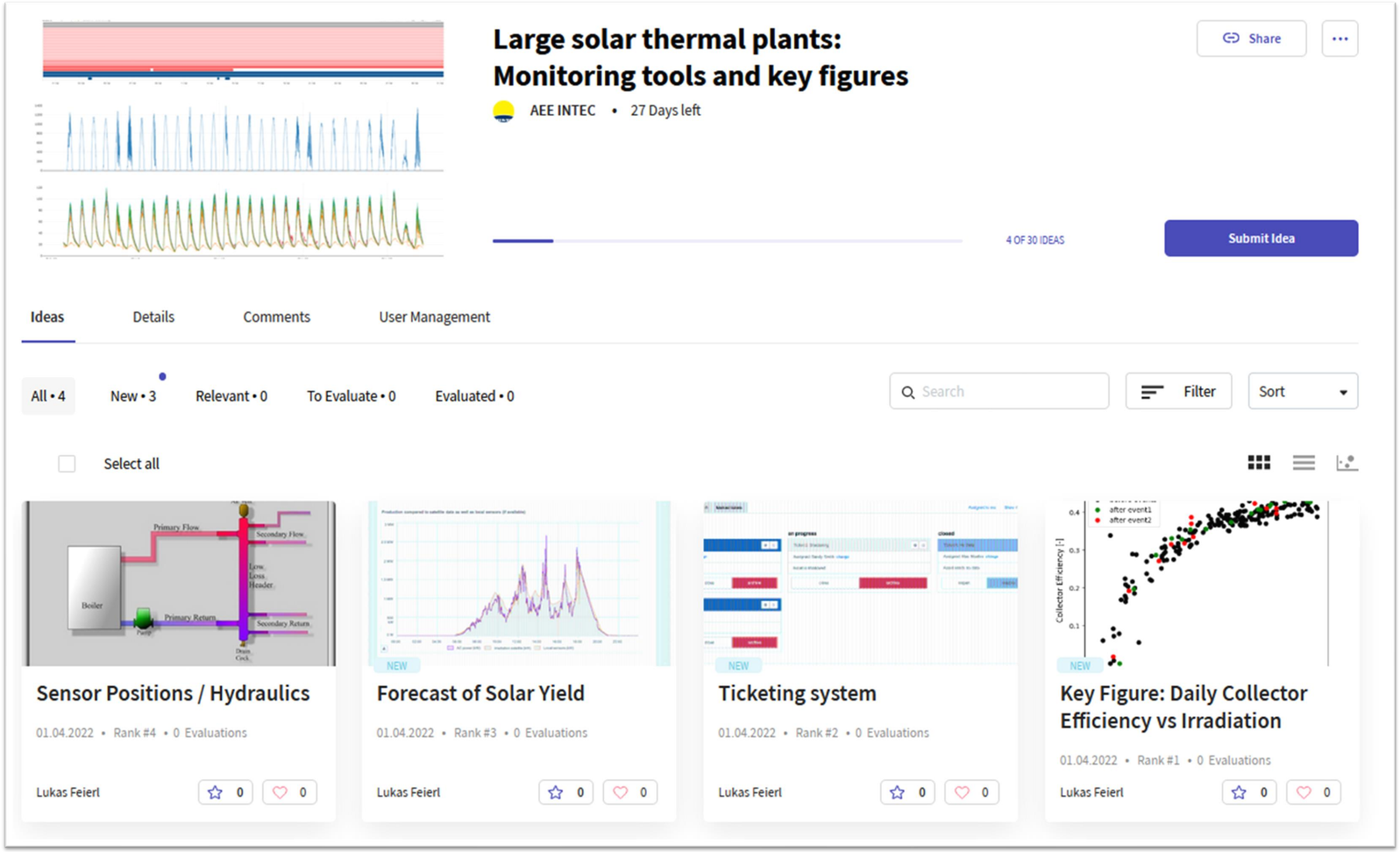
www.anyidea.ai

Open innovation platform

Goal

Integrate **user requirements** into the software tool.

- Allows to reach stakeholders around the globe
- Offers opportunities for exchange, discussion and networking.



Related publications

IEA Fact Sheet	Tschopp, D. et al. (2021) Application of Performance Check (PC) Method to Large Collector Arrays. IEA SHC FACT SHEET 55 B-D1.1. IEA SHC.	Download
Project Final Report	Ohnewein, P. et al. (2020) Dynamic Collector Array Test (D-CAT). Final Report FFG Project 848766 - MeQuSo. Development of methods for quality assessment of large-scale solar thermal plants under real operating conditions. Gleisdorf: AEE INTEC.	Download
Jornal paper	Tschopp, D. et al. (2022) 'Measurement and modeling of diffuse irradiance masking on tilted planes for solar engineering applications', Solar Energy, 231, pp. 365–378. http://doi.org/10.1016/j.solener.2021.10.083.	Download
Journal Review Paper	Tschopp, D. et al. (2020) 'Large-scale solar thermal systems in leading countries: A review and comparative study of Denmark, China, Germany and Austria', Applied Energy, 270, p. 114997. doi:doi.org/10.1016/j.apenergy.2020.1149970.	Download

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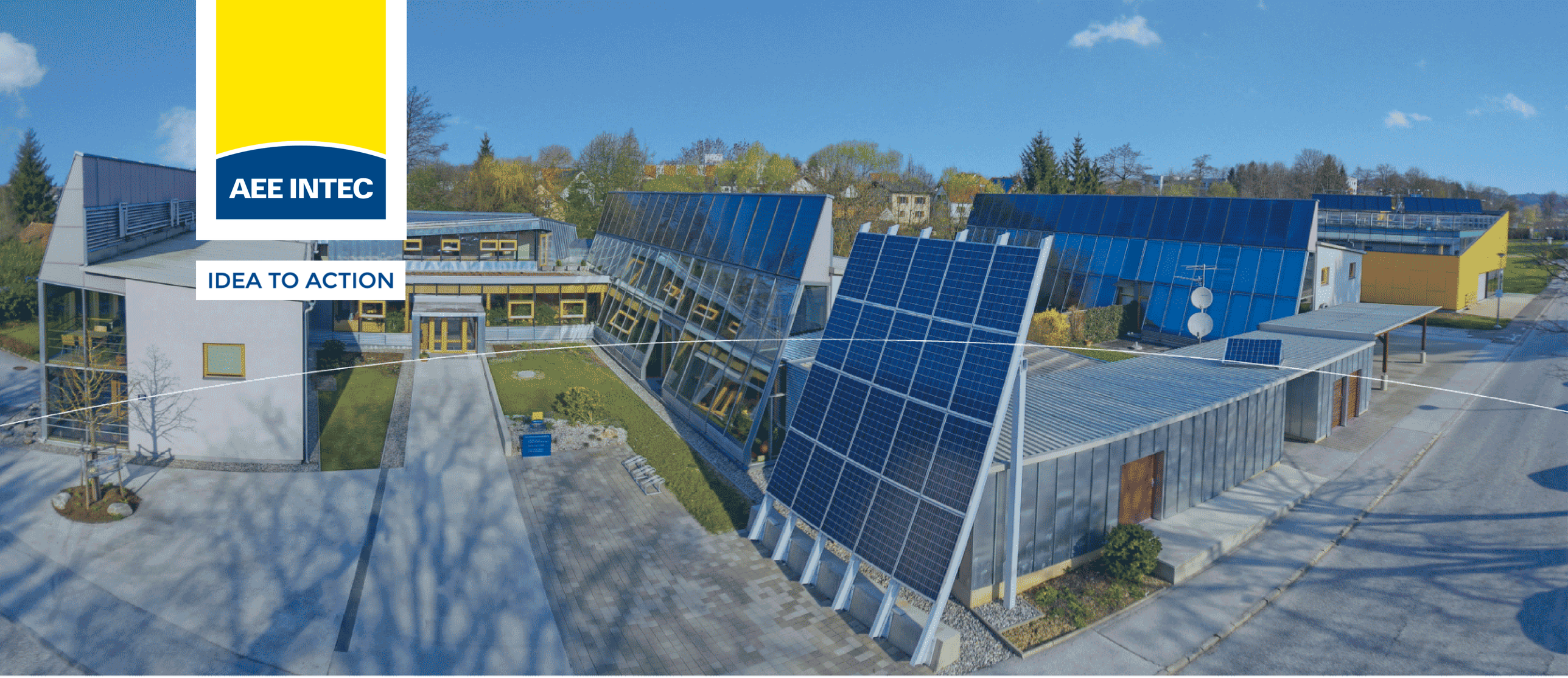
IDEA TO ACTION



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