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pv magazine webinars

Optimizing fast-growing solar energy portfolios

1 November 2023

4:00 pm – 5:00 pm | CET, Berlin, Paris, Madrird

11:00 am – 12:00 pm | EDT, New York City

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Welcome!

Do you have any questions? ❓

Send them in via the Q&A tab. 👉 We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 📹

We‘ll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience. 👀 💡

Amperecloud

Digital solutions for optimized O&Ms.

About me

- Erik Nitschke, CTO
- Since 2013 in pv with EPC and O&M
- Tech, IoT, Cloud
- Worked in several start- and scale-ups

About Us

+65
Team Members

+4 GWp
assets under management

+10 years
of experience in renewable energies

Software & Hardware

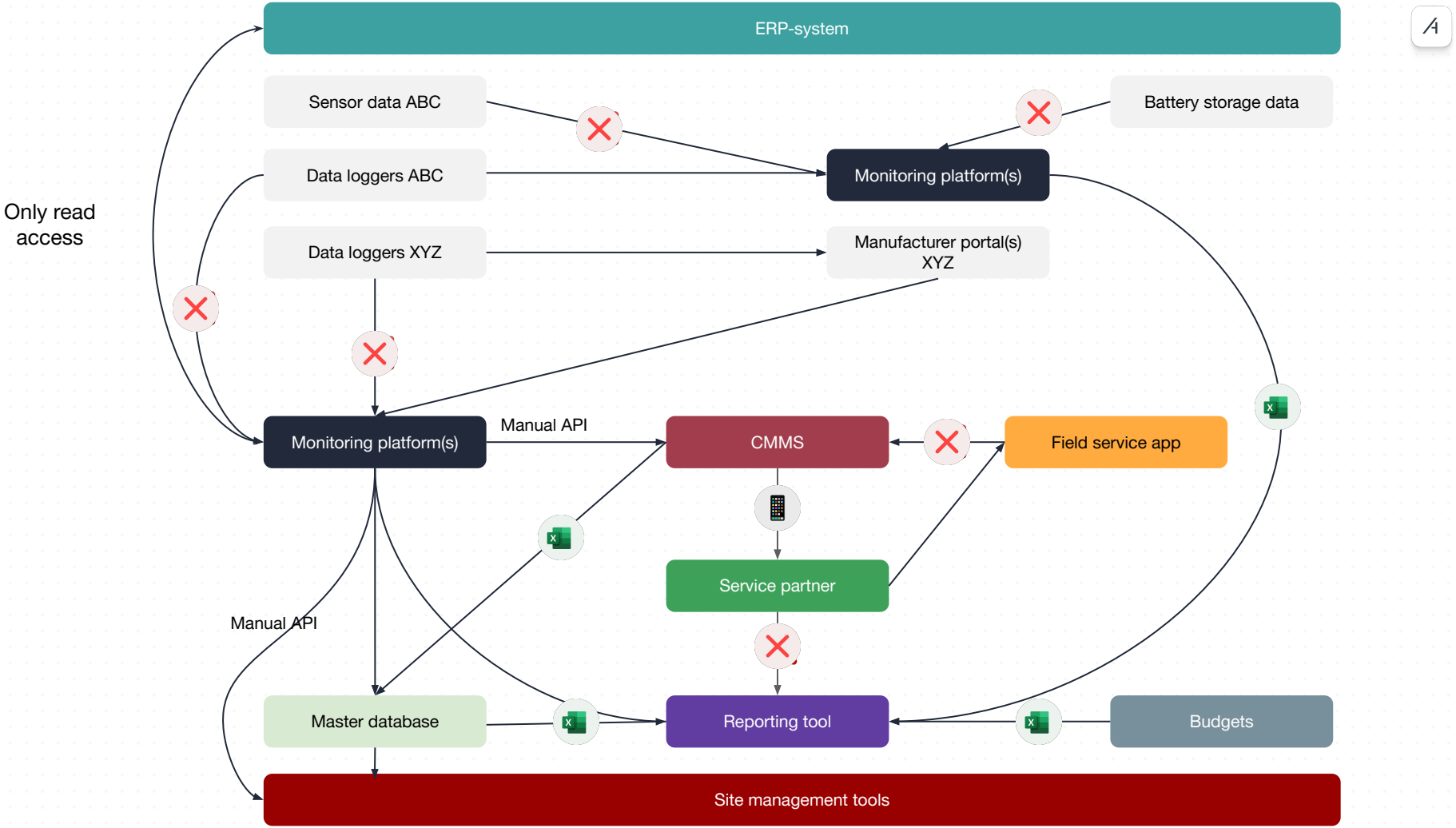
Made in Germany

Key operational challenges for O&Ms

Enormous amount of data streams

Fragmented software landscape

Rapidly growing portfolios


ERP-system
Sensor data ABC
Battery storage data
Data loggers ABC
Monitoring platform(s)
Only read access
Data loggers XYZ
Manufacturer portal(s) XYZ
Monitoring platform(s)
Manual API
CMMS
Field service app
Service partner
Manual API
Master database
Reporting tool
Budgets
Site management tools

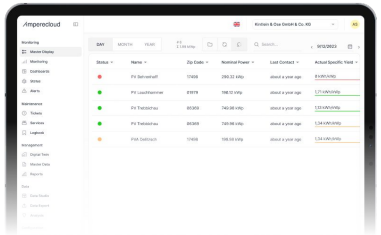
How are we going to face these challenges?

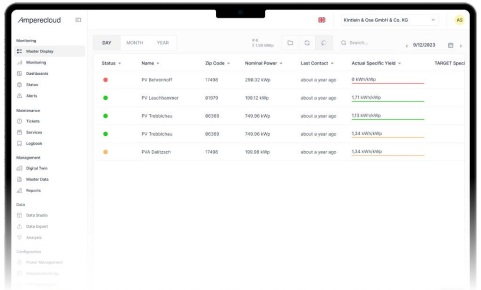
ERP-system

Data sending components

Open API

Amperecloud





Fully integrated monitoring (plants & storage), CMMS, reporting and database platform

Open API

Further tools

Open API

Site management tools

Key challenges for EPCs, Asset Manager and O&Ms

- Enormous amount of data streams
- Fragmented software landscape
- Rapidly growing portfolios

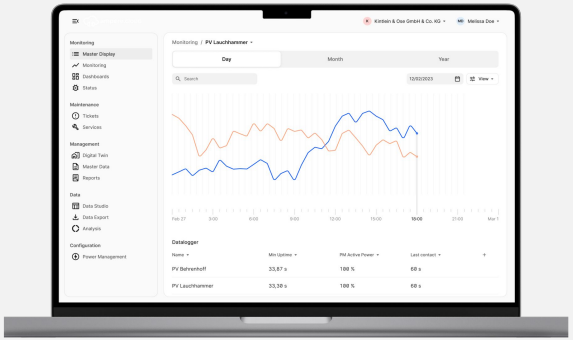
The solution

- Open, automized centralization

Amperecloud: Your partner for growth.

Log

TÜV-certified data logger with enormously high compatibility. Comprehensive insights into all relevant plant data.



Platform

The highly automated, innovative monitoring solution for growing solar companies. Monitor more plants per employee.

Operations

Real-time monitoring of solar farms through our independent control room. Higher revenues through less effort.

+ Redispatch, remote controllability, direct marketing

Zoom into Amperecloud Platform

All power plants and storages in a single system

Connect any data logger, battery storage and component you want.

Enormous level of automation

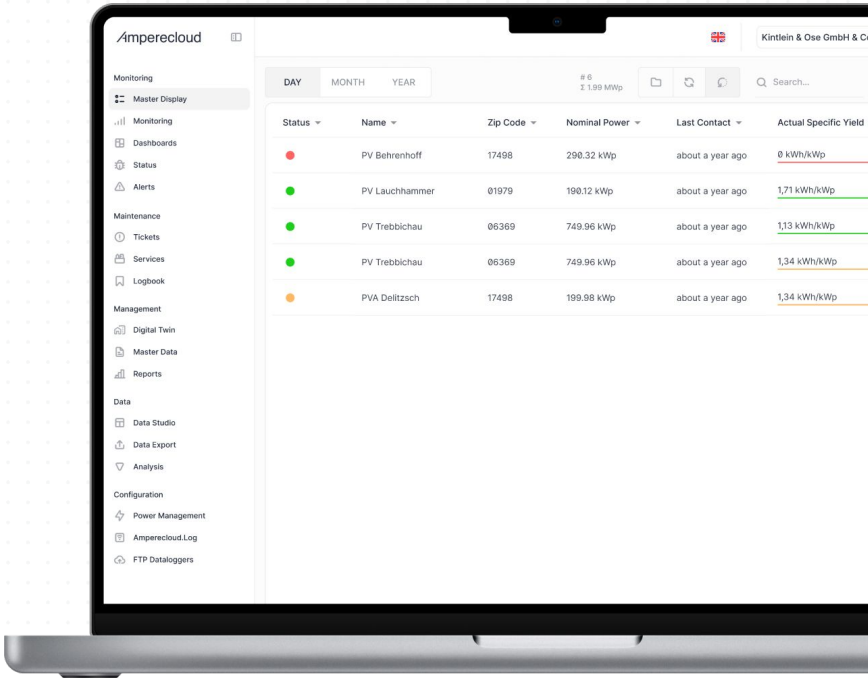
Automate all workflows from plant integrations to reportings.

Fully customizable software

Adjust our solution to your workflow thanks to customizable dashboards, reportings, components and much more..

More than a platform

Dedicated account manager, migration service, technical support - we are a partner, not a software.



Let´s see platform in action.

An open, but also centralized software landscape is the base for efficient O&M.

Amperecloud

#thank you

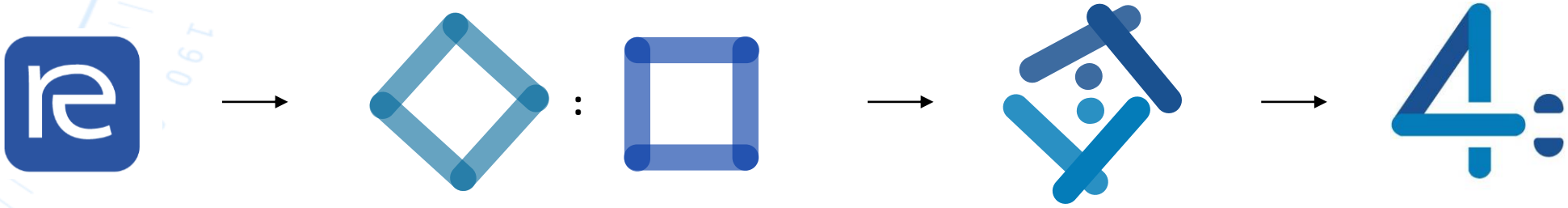
4:energy

Your strong partner for O&M of ground-mounted solar farms

31.10.2023

Founding idea

Combining finance and technology for sustainable technical management of german ground-mounted solar power plants and for comprehensive commercial management of renewable energy projects in Europe.



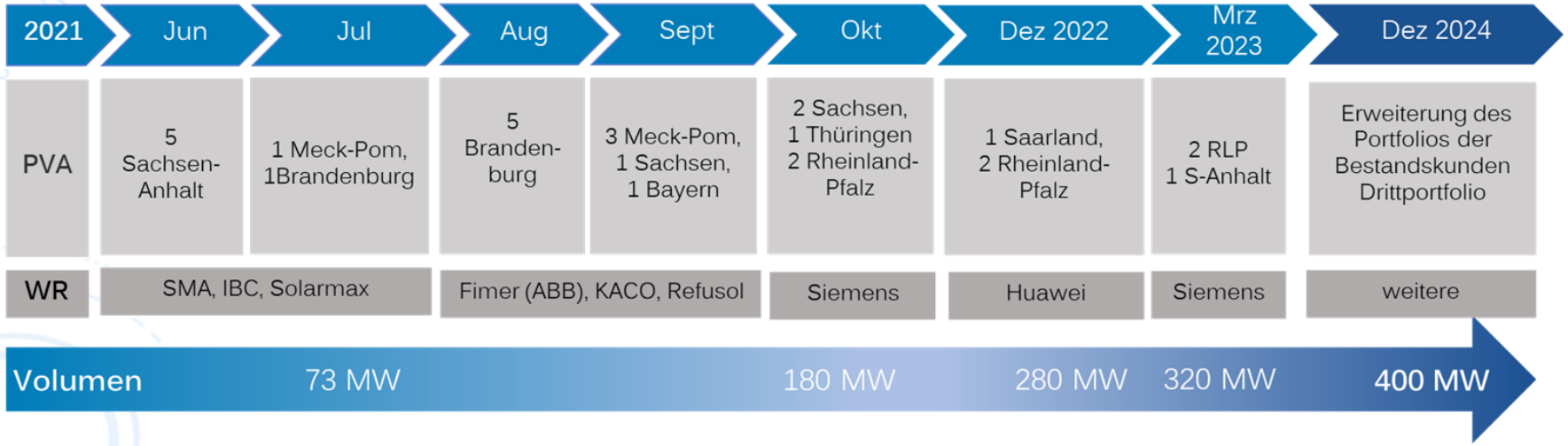
4: Team

- **Prenzlau**
  - Headquarters of the technical operations management is the technical control center, headed by our service manager with over 20 years of experience in the PV industry
  - Location of the control room with 1st level monitoring for all managed facilities, ticketing, automated reporting and currently in the process of KRITIS certification.
  - On-site storage capacity for materials and machinery (incl. mowing machines); office space and IT service provider for PVAs directly on site
  - All technicians have switching authorizations up to 36 kV and are trained on all inverters.
  - Own team for green space maintenance with own equipment

- **Mayen-Koblenz**
  - Service location for the western plants and headquarters of commercial operations management and technical engineering
  - 2nd level support for the control room
  - Engineering services (design planning, repowering, etc.)
  - Special competence for Siemens central & decentralized inverters, switching authorizations up to 36 kV
  - Office space as well as storage capacity for material and component supply

4: Portfolio

- **Assets under management**
  - All parks are integrated in the **control room** for central monitoring
  - There are on-call services on weekends and holidays
  - Each solar farm can be reached within 5 hours by service technicians from one of the two locations. If this is not possible (currently the case for one park), support is ensured via an on-site SubDL.
  - All inverter types, modules, substructures, telecontrol technology and grid connection via transfer or transformer stations in support.
  - The total **portfolio** under management will amount to **350 MWp** in Germany, in open space, by the end of the year.



4: Technical O&M

Technical O&M

- Monitoring
- Maintenance
- Reporting
- Repairs
- Technical management
- Accompaniment of damage & warranty cases
- Safety inspections (DGUV03)

Additional services

- Lawn care and A&E measures
- TBF for substations
- Measurement and thermographic examinations
- Cleaning of modules

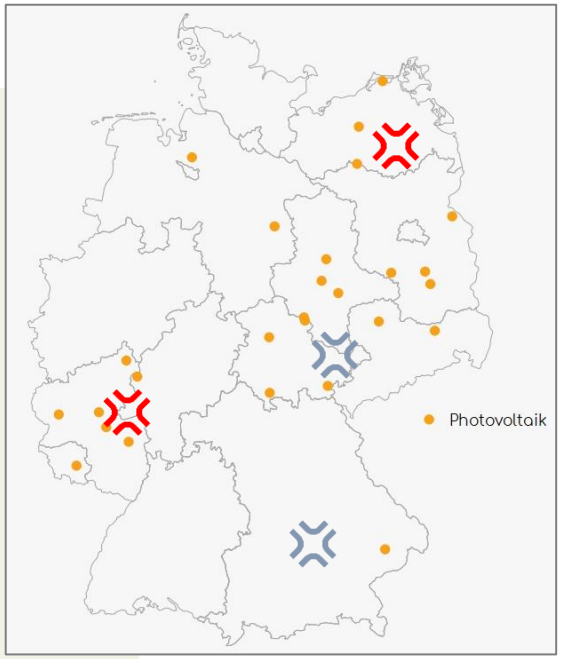
Technical Engineering

- Site plan drawings
- Design planning
- Technical potential analyses for repowering

4: Economical management

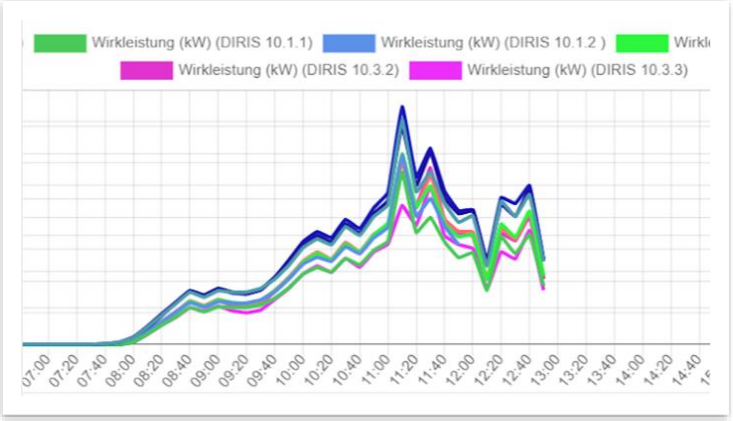
Currently, we are in the process of establishing the **economical management** of renewable energy projects. The portfolio for besides solar also include other technologies. The headquarter is in Mayen and uses both existing locations of 4:energy. In the future, further operating sites will be established in Central and Southern Germany.

- **Commercial management** in Germany
- **Asset Servicing** for renewable energies
- **Domiciliation** in Germany
- **Providing of the managing director**
- Special commercial and economical topics



4:e Control room

- **Monitoring with Amperecloud Platform**
  - **Control room** with 24/7 monitoring
  - 1st level support, daily controls, alarm system
  - **Performance monitoring** and variance analyses
  - Software-based **ticketing** and checklists for service deployment in the field
  - Electronic **file** of the plant
  - Automated and individualized reporting
  - **Deadline management** for HSE and safety checks
  - one-stop-shop for **hardware & software** with configurations on all inverter types in the portfolio
  - **Interfaces for external data** (irradiation sensors, camera images etc.)
  - **KRITIS certification** of the 4:e control room is being implemented



4: Reports

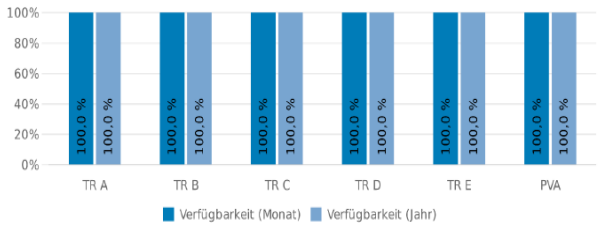
1 Anlagenübersicht

Grunddaten			
-	-	-	-
Photovoltaikanlage	Brönnchesthal	Energieversorger	MVV Energie AG?
Bundesland	Saarland	Netzbetreiber	Steag Netz GmbH
Gesamtleistung in kWp	7.877	Direktvermarkter	MVV Energie AG
Soll-Ertrag in kWh	7.927.171	Soll-Einstrahlung in kWh/m²	1.279
spez. Ertrag in kWh/kWp	1.006	Soll-Performance Ratio in %	85,3
Wechselrichterhersteller	Huawei	Modulhersteller	BYD
Wechselrichtertyp	Huawei Sun2000-20KTL	Modultyp	3.520 x BYD 260 P6C-30 27.300 x BYD 255 P6C-30
Wechselrichteranzahl	300	Modulanzahl	30.820

Baufeld	Einheit	Nennleistung Trafo	Wechselrichteranzahl	Installierte Leistung DC
	-	kVA	-	kWp
1	TR A	1.600	60	1.546
1	TR B	1.600	60	1.530
1	TR C	1.600	60	1.576
1	TR D	1.600	60	1.608
1	TR E	1.600	60	1.608

Photovoltaikanlage Brönnchesthal, Blickrichtung Nord

5.4 Datenverfügbarkeit

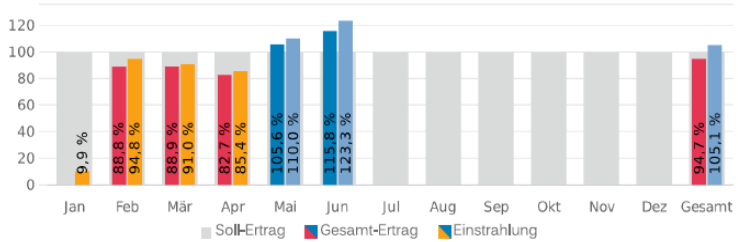


2.1 Einspeisedaten

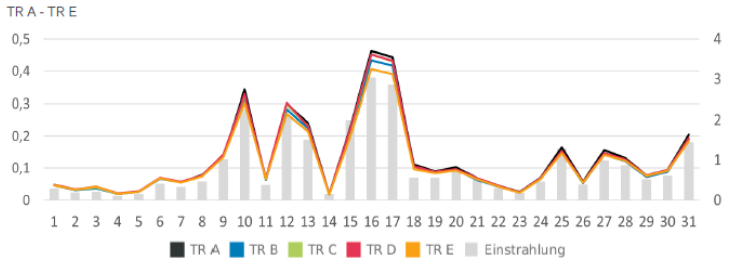
Monat	Netto-Ertrag	Ausgleichs-zahlungen	Gesamt-Ertrag	Soll-Ertrag	Soll-Ist-Vergleich	Soll-Ist-Vergleich	Brutto-Ertrag	Netz-verluste
-	kWh	kWh	kWh	kWh	kWh	-	kWh	-
Jan	0	0	0	279.590	-279.590	0,0 %	33	100,0 %
Feb	420.364	0	420.364	473.518	-53.153	88,8 %	423.431	0,7 %
Mär	875.643	1.911	877.554	987.487	-109.932	88,9 %	883.314	0,9 %
Apr	1.139.045	48.790	1.187.835	1.436.020	-248.185	82,7 %	1.149.544	0,9 %
Mai	1.665.244	16.791	1.682.036	1.593.066	88.970	105,6 %	1.682.706	1,0 %
Jun	1.935.384	929	1.936.314	1.672.779	263.535	115,8 %	1.956.419	1,1 %
Jul				1.651.364				
Aug				1.462.194				
Sep				1.148.102				
Okt				671.015				
Nov				305.764				
Dez				216.533				
Gesamt	6.035.682	68.422	6.104.103	11.897.432	-338.356	94,7 %	6.095.447	1,0 %

Der Gesamt-Ertrag im Juni 2023 beträgt 1.936.314 kWh. Die Ausgleichszahlungen auf Grundlage überschlägiger Berechnungen betragen 929 kWh. Somit wurden 115,8 % des monatlichen Soll-Ertrags erreicht.

2.2 Soll-Ist-Vergleich der Erträge und der Einstrahlung in %



4.4 Tageserträge in kWh/kWp und mittlere Einstrahlung in kWh/m² im Dezember 2022



6.1 Terminplaner

	Dezember 2022	Januar 2023	Februar 2023	März 2023	April 2023
-	-	-	-	-	-
PVA	-	-	-	-	-

Datum	Einheit	Kürzel	Anmerkung
-	-	-	-
fällig/überfällig	-	-	-

Vertraglich geschuldete Inspektionen und Wartungen

Beschreibung	Letzte Prüfung	Nächste Prüfung
-	-	-
Inspektion und Wartung der PVA – jährlich	03/2022	2023
Inspektion der ÜGS – jährlich	03/2022	2023
Inspektion der Trafostation – jährlich	03/2022	2023
Wartung der ÜGS – alle 2 Jahre	03/2022	2024
Wartung der Trafostation – nach Herstellerangaben, mind. alle 3 Jahre	03/2022	2025
DGUV V3 Prüfung – alle 4 Jahre		
Grünpflege – zweimal jährlich (Mai/Juni und August/September)	2022	2023

6.2 Ereignisübersicht/Betriebsstörungen

In der Ereignisübersicht werden Ereignisse, die kürzer als zwölf Stunden sind, standardmäßig ausgeblendet. Die ausgewiesenen Ertragsausfälle dienen als Orientierung und stellen keine Grundlage für die Durchsetzung von Forderungen dar.

Gesamtanlage

Datum	Ereignis	Kommentar
von / bis	-	-
02.03.2022 09.03.2022	WR_C4D – wenig Produktion Sturmschaden	Wechselrichter produziert mit wenig Leistung im Vergleich zu anderen Wechselrichtern. Grund hierfür war ein durch den Sturm gelöstes Modul, welches wieder montiert und angeschlossen wurde.
03.03.2022 18.07.2022	WR_B2F – ohne Leistung Austausch	Der Wechselrichter war ohne Leistung. Auch vor Ort konnte der Wechselrichter nicht mehr in Funktion gebracht werden. Entsprechend wurde die Garantieabfrage bei Huawei gestartet. Anschließend wurde der Wechselrichter zum Tausch angemeldet und das Ersatzgerät nach Prenzlau geliefert. Der neue Wechselrichter wurde eingebaut und in Betrieb genommen (neue SN: 101950023546)
05.07.2022 13.07.2022	WR_A2E – ohne Leistung	Vor Ort wurde festgestellt, dass ein defekter Modulstrecker die Ursache für den Leistungsverlust war. Der defekte Modulstecker MC4 wurde entsprechend ausgetauscht und der Wechselrichter produzierte wieder.

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5:00 pm – 6:00 pm CET, Berlin, Paris, Madrid

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A deep dive into battery supply chain and pricing

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Thank you for joining today!