

## User Manual of the CKAN Data Server of PEARL PV

## Introduction

This user guide contains instructions for the use of the web interface of the CKAN data server of COST Action PEARL PV. This data server has been established to publish and upload data of monitored installed PV systems and to quantitatively evaluate the long-term performance and reliability of these PV systems in Europe and elsewhere.

First and foremost, we thank you for uploading and providing access to your collected data. Once your data is published, other users can use CKAN's search features to browse and find the data they need, and preview it using maps, graphs and tables.

## **Datasets and resources**

On the CKAN-based site, data is published in units called "datasets". A dataset is a parcel of data and has two different elements: metadata and resources:

- "metadata" cover information about the data. For example, the title and publisher, date, what formats it is available in, what license it is released under, etc.
- "resources" hold the data itself. A resource can be a CSV or Excel spreadsheet, XML file, PDF document, image file, linked data in RDF format, etc. A dataset can contain any number of resources. For example, different resources might contain the data for different years, or they might contain the same data in different formats.

## **Registering and logging in**

Registration is needed for most publishing features and for personalization features, such as "following" datasets.

To create a user ID, use the "Register" link at the top of any page. CKAN will ask for the following:

- Username choose a username using only letters, numbers, and \_ characters. For example, "jbloggs" or "joe\_bloggs93".
- Full name to be displayed on your user profile
- E-mail address this will not be visible to other users
- Password enter the same password in both boxes



Registration	
Vhy Sign Up?	
Create datasets, groups and other	Register for an Account
xciting things	* Username:
	username
	Full Name:
	Joe Bloggs
	* Email:
	joe@example.com
	* Password:
	* Confirm:
	Please read the NDA and check if agree:
	I Accept.
	* Required field

If there are problems with any of the fields, CKAN will tell you the problem and enable you to correct it. When the fields are filled in correctly, CKAN will create your user account and automatically log you in.

It is perfectly possible to have more than one user account attached to the same e-mail address. For this reason, choose a username you will remember, as you will need it when logging in.

### Adding a new dataset

<u>Step 1.</u>

You can access "Create dataset" screen in two ways after logging in/registering.

a. Select the "Datasets" link at the top of any page.



earch data	
E.g. environment	Welcome to the Pearl PV CKAN
	Repository
opular tags	This website is currently in development. For details contact Fjodor van Sloo
	A quick start guide for PearIPV members will be available in the near future.
earl PV CKAN Repository statistics	We strongly urge you to read the CKAN User guide before using this site. Als reading the API Guide might be a good idea if you want to use the API.
datasets 1 organization 0 groups	Quicklinks to help:
	Add a dataset     Edit a dataset
	More in the User Guide
	the second s

From this, above the search box, select the "Add Dataset" button.

PAR,	Datasets Organizations Groups About	Search O
		+
Datasets		
Organizations	Add Dataset	
pearl-pv 3		
T Groups	Search datasets	Q
There are no Groups that match this earch	3 datasets found Orde	er by: Relevance v
r Tags		
est_tag 2	PRIVATE test data	
PI 1	to test uploading a JSON file	
<sup>p</sup> ython 1		
est2 1	PRIVATE Not a real data set	
	This dataset has no description	
Formats		

b. Alternatively, select the "organizations" link at the top of a page.



ARLPN		Datasets Organizations Groups About Search
Search data		
E.g. environment	Q	Welcome to the Pearl PV CKAN
		Repository
opular tags		This website is currently in development. For details contact Fjodor van Slooten
		A quick start guide for PearIPV members will be available in the near future.
Pearl PV CKAN Repository statistics datasets 1 organization 0 groups		We strongly urge you to read the CKAN User guide before using this site. Also reading the API Guide might be a good idea if you want to use the API.
		Quicklinks to help:
		Add a dataset     Edit a dataset
		More in the User Guide

Now select the page for the organization that should own your new dataset.

Caleson						eb.	0 🗘
ARI		Datasets	Organizations	Groups	About	Search	
				T		+	7
Organizations hat are Organizations?							
CKAN Organizations are used to create, manage and publish collections of datasets. Users can have different roles within an Organization, depending on their level of authorisation to create, edit and publish.	Search organizations						Q
	1 organization found				Order by:	Name Ascend	ding
	pearl-pv						
	Umbrella organization for non-affiliated data						
	3 Datasets						

Provided that you are a member of this organization, you can now select the "Add Dataset" button above the search box.



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AR	P J Datasets Otgan	inizations Groups About Search	
Organizations / pearl-pv			
	Activity Stream 1 About		
earl-pv	Add Dataset  Search datasets		Q
nbrella organization for non-affiliated ta read more llowers Datasets	3 datasets found	Order by: Relev	vance •
3 © Follow	PRIVATE test data to test uploading a JSON file JSON		
Organizations			
ari-pv 3	PRIVATE         Not a real data set           This dataset has no description		
Groups	TXT		

#### <u>Step 2.</u>

PEARL PV asks the following information about your data. (The actual data will be added in step 4.)

- Title This title will be unique, so make it brief but specific. E.g. "Berlin PV data by months" is better than "PV data".
- Description You can add a longer description of the dataset here, including information such as where the data is from and any information that people will need to know when using the data.
- Tags Here you may add tags that will help people find the data and link it with other related data. Examples could be "rooftop", "CIGS", "Berlin". Hit the Enter button between tags. If you enter a tag wrongly, you can use its delete button to remove it before saving the dataset.
- License It is important to include license information so that people know how they can use the data. This field is a drop-down box. If you need to use a license not on the list, contact the admin of Pearl PV site. License definitions and additional information can be found at http://opendefinition.org/
- Location name The name of the PV field or the laboratory.
- GPS Coordinates Here you can provide the GPS Coordinates of the site, (Latitude, Longitude, positive is North, positive is East).



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P A R L	P V Datasets Organizations Groups About Search Q	
A / Datasets / Create Dataset		
What are datasets?		
A CKAN Dataset is a collection of data resources (such as files), together with a description and other information, at a fixed URL. Datasets are what users see when searching for data.	1 Create dataset 2 Add data	
	Title:	
	Berlin outdoor lab results	
	* URL: ckan.pearlpv-cost.eu/dataset/berlin-outdoor-lab-results Edit	
	Description:	
	PV data from the outdoor measurement system in Berlin	
	You can use Markdown formatting here	
	Tags:	
	× PV data × Berlin × outdoor	
	License:	
	Open Data Commons Attribution License *	
	License definitions and additional information can be found at http://opendefinition.org/	
	* Location name:	
	Berlin outdoor lab	
	* GPS Coordinates:	
	53.43N,13.53E	
	Please provide the GPS     coordinates: Latitude, positive     is North, Longitude, positive is     East	

- Restriction to publication Please provide here if there are any restriction to publication of / on this dataset, e.g. 'contact owner prior to publication'. If there is not any restriction, please write: no restriction on publications.
- Author The name of the person or organization responsible for producing the data.
- Author Email An e-mail address for the author, to which queries about the data should be sent.
- Maintainer If necessary, name for a second person responsible for the data.
- Maintainer Email If necessary, e-mail for a second person responsible for the data.
- Keywords Field to provide any keyword(s) that describe(s) your specific dataset.

The following information should be provided for all types of installation, please start with one set of information. You will be given the option to add further sets.

- Fixed installation, tilt Ground to module, if installation is fixed, else put 'n.a.'.
- Fixed installation, azimuth South (180°) to East (90°) to North (0°) and West (270°), if installation is fixed, else put 'n.a.'.
- Tracking mode Select an option (none/1-axis/2-axis) listed in the drop-down list.
- Type of installation Select an option (free-standing installation/BAPV tilted roof/BAPV flat roof/BAPV facade/floating) listed in the drop-down list.

## P 🌗 A R L P V

Restriction to publication:	
no restriction on publication	
Are there any restrictions to publications ofton this dataset?	
Author:	
Person Example	
Author Email:	
person@example-berlin.de	
Aaintainer:	
Second ExamplePerson	
Aaintainer Email:	
second.person@example-berlin.de	
Keywords:	
Fixed installation, tilt:	
35°	
Ground to module, if installation is fixed, else put 'n.a.'  Fixed installation, azimuth in °:	
180	
180(* = South), 90(* = East),	
(i) (i) = Sourn), 90(1 ← Less), (i) = Sourn) a270(2 − West), (i) installation is fixed, else put in.a.'	
Q(* = North) and 270(* = West), if installation is fixed, else put	
Q(* = North) and 270(* = West), if installation is fixed, else put 'n.a.'	v
Q(* = North) and 270(* = West), i'installation is fixed, else put 'n.a.'	v

- PV module technology Provide the technology of the PV module.
  - If bifacial, please specify
    - bifaciality factor, e.g. 0.20 ...
    - albedo at side, e.g. 0.20 ...
    - additional comments, e.g. grassland installation
- Total number of PV modules in the system Provide a total number of PV modules in the system.
- Number of modules connected in one string Provide a number of modules connected in one string.
- Number of strings connected to each inverter Provide a number of strings connected to each inverter.
- Total number of PV strings in the system Provide a number of strings connected to each inverter.
- Laboratories or test sites Number of PV modules in the data set if applicable. In case your data set does not fit to this information request, give additional information in the comment field.
- Shading Select an option (not specified/far horizon/near/no shading) and give a rough estimate on annual performance loss
- First date of measurements In this field you can provide the first day of measurements.
- Last date of measurements In this field you can provide the last day of measurements.

	PV module technology:
	10 CIGS modules with AR front glass, details
То	otal number of PV modules in the system:
1	10
0	Provide a total number of PV modules in the system
Nu	umber of modules connected in one string:
-	5
n	Provide a number of modules connected in one string
Nu	umber of strings connected to each inverter:
	2
e	Provide a number of strings connected to each inverter
	Provide a number of strings     connected to each inverter
la	aboratories or test Sides:
	5, others are confidential, note that sizes differ between modules, module 1 is 15x30cm <sup>2</sup> , module 2 is 30x30cm <sup>2</sup> , 3 is a fill
	size of
ş	size of
sh	Size of You can use Markdown formatting here
Sh	Size of You can use Markdown formatting here
Sh Fir	size of You can use Markdown formatting here hading: no shading
Sh	size of You can use Markdown formatting here hading: no shading rst date of measurements:

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D

- Organization If you are a member of any organizations, this drop-down will enable you to choose which one should own the dataset. You should ensure that you choose the correct organization for the dataset, since at present, this cannot be changed later.
- Visibility a Public dataset is public and can be seen by any user of the site. A Private dataset can only be seen by members of the organization owning the dataset and will not show up in searches by other users.
- Source Webpage or link where the dataset is available (if applicable). An upload option is given on the next page that you reach when clicking 'Next-add data' at the bottom.
- Version The version of the uploaded dataset, please start with '1.0'..

# P 🛑 A R L P V

	* Organization: pearl-pv	
	Visibility: Private	۲
	Source: http://example.com/dataset.json	
	Version: 1.0]	
	The data license you select above only applies to the contents of any resource files that you add to this dataset. By submitting this form, you agree to release the <i>metadata</i> values that you enter into the form under the Open Database License.	quired field Next: Add Data
About Pearl PV CKAN Repository		Powered by
CKAN API CKAN Association		CKAN Language: English

#### <u>Step 3.</u>

When you have filled in the information on this page, select the "Next: Add Data" button.

	* Organization:	
	pearl-pv	*
	Visibility:	
	Private	•
	Source:	
	http://example.com/dataset.json	
	Version:	
	1.0	
	The data license you select above only applies to the contents of any resource files that you add to this dataset. By submitting this form, you agree to release the metadata values that you enter into the form under the Open Database License.	3
About Pearl PV CKAN Repository	Powered by	
CKAN API CKAN Association	🖂 ckan	
OPEN DATA	Language: English	Ŧ

#### <u>Step 4.</u>

Now, you can see the "Add data" screen.



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P A R L	Datasets Organizations Groups About Search Q
A / Datasets / Create Dataset	
What's a resource?	
A resource can be any file or link to a file containing useful data.	Create dataset
Additional information	File:
It would be very much appreciated if you could add a filled-in template file to the dataset containing as much information as possible. The template can be downloaded DOWNLOAD HERE and upload it as an (new) resource here on the right.	Name:
	Dataset CIGS Berlin outdoor lab 2017 Description:
	data measured continuously, samples 1-3 have AR coating, 4-6 no AR coating
	You can use Markdown formatting here
	Format:
	CSV *
	Previous Save & add another Finish

This is where you will add one or more "resources" which contain the data for this dataset. Choose a file or link for your data resource and select the appropriate choice at the top of the screen:

If you are giving a link to the data, like http://example.com/mydata.csv, then select "Link to a file".

If the data to be added to the system is in a file on your computer, select "Upload a file". The system will give you a file browser to select it.

#### <u>Step 5.</u>

Add the other information on the page. This information is not required, but it is good practice to add it:

- Name a name for this resource, e.g. "Berlin PV data outdoor 2017, CSV". Different resources in the dataset should have different names.
- Description a short description of the resource.
- Format the file format of the resource, e.g. CSV (comma-separated values), XLS, JSON, PDF, etc.

#### <u>Step 6.</u>

If you have more resources (files or links) to add to the dataset, select the "Save & add another" button.

It would be very much appreciated if you could add another file containing as much information as possible on the items listed in the appendix. Use any format you want for that, e.g. an Excel file or word.

Under the "Additional information" label, you can download the appendix file of this user manual, fill in the list and upload it as it was explained in step 4 and step 5.



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A R L	P V Datasets Organizations Groups About Search	(
/ Datasets / Create Dataset		
What's a resource?		
source can be any file or link to a file taining useful data.	1 Create dataset	
Additional information	File:	
ould be very much appreciated if you Id add a filled-in template file to the aset containing as much information	Name:	
nloaded DOWNLOAD HERE and a not new provide the new provided new provi	Dataset CIGS Berlin outdoor lab 2017	
right.	Description:	
	data measured continuously, samples 1-3 have AR coating, 4-6 no AR coating You can use Markdown formatting here	h
	Format:	
	CSV	*
	Previous Save & add another Finit	sh

## <u>Step 7.</u>

Select the 'Finish' button. The dataset was created and you can see the result. You are finished!



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Organizations / pearl-pv / te	est data upload				
est data upload	Dataset 🔮 Gro	oups O Activity Stream			Manage
© Follow	test data u				PRIVATE
] Organization	Data and Resour	l file		e.	Explore -
	Additional Info	user		۲	l Preview Download Edit
and not	Field	Value		Createu	
Dearl-pv Jmbrella organization for non-affiliated lata read more	Category		undefined	undefined	u n d
Twitter					fi
Facebook					e
	PV technology		undefined	undefined	u
License	r v teennology				n



#### APPENDIX

It would be appreciated if you would add additional information in step 6. The following list is an overview of what typically is needed when evaluating your outdoor data. Please, if you can, fill in this list, upload it and provide as much information as possible. It saves you from email requests.

Requested Information	Type/Options	Example
System status	all optional	
system changes during measurement time of uploaded data	free text	module 2 was exchanged on Jan., . 2011 for a similar one after breakd information on module exchanges/converter exchanges, additional implementation thereoj similar
system downtime	free text	every Monday due to regular inspection, and, between Feb. 2 <sup>nd</sup> o 23 <sup>rd</sup> 2004
sensor failures	free text	offset in temperature sensor by 2° sensors all fell off on Feb. 2 <sup>nd</sup> 2004 were reattached on Feb3rd, irradic is given in mW/m <sup>2</sup> not as specified table in W/cm <sup>2</sup>
sensor outages	free text	temperature sensors all fell off on 2 <sup>nd</sup> 2004 and were reattached on Feb3rd
cleaning events	free text	Jan 1 <sup>st</sup> 2003, Feb. 3 <sup>rd</sup> 2019, March 2019,
monitoring fraction		0.4 hours in the month (t) /hours of monitoring activity (t_MA): M = t_MA / t
		The range is 0, for no monitoring t for full monitoring.
Inverter specification PLEASE DUPLICATE AS NEEDED ar	nd give that information for	each inverter in the system
inverter technology/type	free text	SMA, type, transformerless
max AC output power in [kW]	double	3.3
AC power frequency in [Hz]	double	50
max DC input power in [kW]	double	3.6
rated max/EU efficiency [%]	options/check boxes?	99.1,98.2



reactive power control	free text	Yes/no
number of independent mpp inputs	double	
total number of inverters in the system	integer	
data exchange protocol		
RS485	free text	RS485
MODBUS	free text	Not used by us
Web interface/company specific	free text	Company specific
BOS components: Cables and System protection		
cabling, grounding, lightning protections	free text	cabling: experimental setup with 4 point contacts grounding: yes lightning: roof top common lightnin protection behind modules
energy storage system		
energy storage system	free text	battery connected, type of battery
energy storage system	free text	battery connected, type of battery
ilable acquired data		
	free text free text	*minimum 1 year
ilable acquired data rough length of time period of data*	free text check boxes, at least one	
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV-	free text check boxes, at least one	*minimum 1 year 2.5 years
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV- curves sampling interval yield data in	free text check boxes, at least one must be selected	*minimum 1 year 2.5 years string Pmpp
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV- curves sampling interval yield data in unit (sec) recording interval IV data in unit	free text check boxes, at least one must be selected double	*minimum 1 year 2.5 years string Pmpp 1
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV- curves sampling interval yield data in unit (sec) recording interval yield data in unit (sec)	free text check boxes, at least one must be selected double double	*minimum 1 year 2.5 years string Pmpp 1 600
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV- curves sampling interval yield data in unit (sec) recording interval yield data in unit (sec) sampling interval IV data in unit (sec) recording interval IV data in unit	free text check boxes, at least one must be selected double double double	*minimum 1 year 2.5 years string Pmpp 1 600 1
ilable acquired data rough length of time period of data* PV module temperature, module Impp, string Impp, module Vmpp, string Vmpp, module Pmpp, string Pmpp, Yield, outdoor IV- curves sampling interval yield data in unit (sec) recording interval yield data in unit (sec) sampling interval IV data in unit (sec) recording interval IV data in unit (sec)	free text check boxes, at least one must be selected double double double	*minimum 1 year 2.5 years string Pmpp 1 600 1



Vmpp from mpp-tracking, name unit	free text	V
Pmpp from IV scan	free text	not provided
Impp from IV scan	free text	not provided
Vmpp from IV scan	free text	not provided
lsc from IV scan	free text	not provided
Voc from IV scan	free text	not provided
Efficiency	indoor lab measurement/outdoor measurement/not available	Indoor lab measurement
Temperature coefficients of Pmpp/efficiency	yes(preselected)/no	yes
NOCT	yes(preselected)/no	yes
ilable sensor data, transducers, pov	ver meters, imaging	
reference cell, global horizontal irradiance, global tilted plane of array irradiance, air temperature, wind speed, wind direction, precipitation	check boxes, at least one must be selected	reference cell, global horizontal irradiance, global tilted plane of arra irradiance, air temperature, wind speed, wind direction
sampling interval meteorological data in [sec]	double	10
recording interval meteorological data in [sec]	double	600
Irradiance		
Pyranometer details	free text, optional	CMP11
If known: accuracy	free text, optional	+/-10W/m²
reference cell details	free text, optional	Calibrated Si reference
	free text, optional	+/-20W/m <sup>2</sup> above 50W/m <sup>2</sup> , +/-50W/
If known: accuracy	•	below
Temperature		
air temperature sensor details	free text, optional	ClimaSensorUS
If known: accuracy	free text, optional	1°C
PV module temperature sensor	free text, optional	PT100 glued onto module back side i
details		the center of the module
If known: accuracy	free text, optional	1°C
Wind		
	for the transfer of the second	Clime Concert IC
Wind sensor details	free text, optional	ClimaSensorUS
	Troo toxt optional	1 m/s
If known: accuracy of wind speed and direction measurement	free text, optional	1 11/5



meteorological/environmental sensors		
Liquid precipitation/rain sensor detail and if known: accuracy	free text, optional	ClimaSensorUS
Solid precipitation/rain sensor detail and if known: accuracy	free text, optional	ClimaSensorUS
any other sensors	free text, optional	spectrometer EKO WISER
Current and voltage transducers		
<u>_</u>		
DC current transducers details	free text, optional	n/a
DC voltage transducers details	free text, optional	n/a
AC current transducers details	free text, optional	n/a
AC voltage transducers details	free text, optional	n/a
Power meters		
DC power meter details	free text, optional	mpp tracker by LOPV
AC power meter details	free text, optional	Inverter, name supplier
IR and EL images		
additional IR/EL images available upon request	yes/no (preselected: no)	yes
lity Control		
If known: what is the accuracy of your measured PV data?	free text, optional	above 50W/m²: 2W for Pmpp, 1A j Isc,
What are the calibration procedures?	free text, optional	sensors are calibrated as specified provider, spectrometer is calibrate annually, temperature sensors
		calibrated upon module exchange,
		least annually
What are the data quality control procedures? / Maintenance practice?	free text, optional	
	free text, optional free text, optional	weekly visual inspection (removal o



developed hardware/software



## Acknowledgement

This publication is based upon work from COST Action CA16235 PEARL PV supported by COST (European Cooperation in Science and Technology)

## **COST Action Pearl PV**

COST Action PEARL (CA16235) PV is focused on "Performance and Reliability of Photovoltaic Systems: Evaluations of Large-Scale Monitoring Data".

The aim of PEARL PV is to improve the energy performance and reliability of photovoltaic (PV) solar energy systems in Europe leading to lower costs of electricity produced by PV systems by a higher energy yield, a longer life time eventually beyond the guaranteed 20 years as specified by manufacturers, and a reduction in the perceived risk in investments in PV projects.

This will be achieved by analyzing data of the actual monitored long-term performance, defects and failures in PV systems installed all over Europe to quantitatively determine the absolute influences of components rated performance, key design of systems, installation, operation, maintenance practice, geographic location and weather factors on the performance, performance degradation over time and failure modes of these PV systems.

Website PEARL PV: www.pearlpv-cost.eu

## **COST** Association

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Our Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.

Website COST: www.cost.eu

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