

# Solar Photovoltaic Facilities Database



**Tags**  
photovoltaic solar

## Summary

The United States Large-Scale Solar Photovoltaic Database (USPVDB) provides the locations and array boundaries of U.S. ground-mounted photovoltaic (PV) facilities with capacity of 1 megawatt or more. It includes corresponding PV facility information, including panel type, site type, and initial year of operation. The creation of this database was jointly funded by the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) via the Lawrence Berkeley National Laboratory (LBNL) Energy Markets and Policy Department, and the U.S. Geological Survey (USGS) Energy Resources Program. The PV facility records are collected from the U.S. Energy Information Administration (EIA), position-verified and digitized from aerial imagery, and checked for quality. EIA facility data are supplemented with additional attributes obtained from public sources. Version: USPVB\_V1\_0\_20231108

## Description

The United States Large-Scale Solar Photovoltaic Database (USPVDB) provides the locations and array boundaries of U.S. ground-mounted photovoltaic (PV) facilities with capacity of 1 megawatt or more. It includes corresponding PV facility information, including panel type, site type, and initial year of operation. The creation of this database was jointly funded by the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) via the Lawrence Berkeley National Laboratory (LBNL) Energy Markets and Policy Department, and the U.S. Geological Survey (USGS) Energy Resources Program. The PV facility records are collected from the U.S. Energy Information Administration (EIA), position-verified and digitized from aerial imagery, and checked for quality. EIA facility data are supplemented with additional attributes obtained from public sources. Version: USPVB\_V1\_0\_20231108

## Credits

U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO), Lawrence Berkeley National Laboratory (LBNL) Energy Markets and Policy Department, U.S. Geological Survey (USGS) Energy Resources Program, and U.S. Energy Information Administration (EIA),

The suggested citation for use in academic papers and otherwise where applicable is as follows: Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B., 2023, United States Large-Scale Solar Photovoltaic Database v1.0 (November, 2023): U.S. Geological Survey and Lawrence Berkeley National Laboratory data release, <https://doi.org/10.5066/P9IA3TUS>.

## Use limitations

Map services and data downloaded from the U.S. Large-Scale Solar Photovoltaic Database are free and in the public domain. There are no restrictions; however, we request that the following acknowledgment statement be included in products and data derived from our map services when citing, copying, or reprinting: "Map services and data are available from Large-Scale Solar Photovoltaic Database, provided by the U.S. Geological Survey and Lawrence Berkeley National Laboratory via <https://eerscmap.usgs.gov/uspvdb>".

## Extent

**West** -159.763181    **East** -68.984923  
**North** 47.869994    **South** 20.764749

## Scale Range

**Maximum (zoomed in)** 1:5,000  
**Minimum (zoomed out)** 1:50,000,000

## Topics and Keywords

THEMES OR CATEGORIES OF THE RESOURCE    boundaries, structure, utilitiesCommunication

\* CONTENT TYPE    Downloadable Data  
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION    No

THEME KEYWORDS    solar, photovoltaic

## Citation

TITLE    Solar Photovoltaic Facilities Database  
PUBLICATION DATE    2023-11-08  
PRESENTATION FORMATS    \* digital map

### OTHER CITATION DETAILS

The suggested citation for use in academic papers and otherwise where applicable is as follows: Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B., 2023, United States Large-Scale Solar Photovoltaic Database v1.0 (November, 2023): U.S. Geological Survey and Lawrence Berkeley National Laboratory data release, <https://doi.org/10.5066/P9IA3TUS>.

Map services and data downloaded from the U.S. Large-Scale Solar Photovoltaic Database are free and in the public domain. There are no restrictions; however, we request that the following acknowledgment statement be included in products and data derived from our map services when citing, copying, or reprinting: "Map services and data are available from Large-Scale Solar Photovoltaic Database, provided by the U.S. Geological Survey and Lawrence Berkeley National Laboratory via <https://eerscmap.usgs.gov/uspvdb>".

## Citation Contacts

### RESPONSIBLE PARTY

INDIVIDUAL'S NAME    Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B.  
ORGANIZATION'S NAME    Lawrence Berkeley National Laboratory  
CONTACT'S ROLE    originator

## Resource Details

DATASET LANGUAGES    \* English (UNITED STATES)  
DATASET CHARACTER SET    utf8 - 8 bit UCS Transfer Format

STATUS    completed  
SPATIAL REPRESENTATION TYPE    \* vector

\* PROCESSING ENVIRONMENT    Version 6.2 (Build 9200) ; Esri ArcGIS 10.8.0.12790

### CREDITS

U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO), Lawrence Berkeley National Laboratory (LBNL) Energy Markets and Policy Department, U.S. Geological Survey (USGS) Energy Resources Program, and U.S. Energy Information Administration (EIA),

The suggested citation for use in academic papers and otherwise where applicable is as follows: Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B., 2023, United States Large-Scale Solar Photovoltaic Database v1.0 (November, 2023): U.S. Geological Survey and Lawrence Berkeley National Laboratory data release, <https://doi.org/10.5066/P9IA3TUS>.

### ARCGIS ITEM PROPERTIES

\* NAME    solar\_pv\_database\_231108\_v1

## Extents

### EXTENT

DESCRIPTION  
Publication date

TEMPORAL EXTENT  
DATE AND TIME    2023-11-08

VERTICAL EXTENT  
\* MINIMUM VALUE    0.000000  
\* MAXIMUM VALUE    0.000000

### EXTENT

GEOGRAPHIC EXTENT  
BOUNDING RECTANGLE  
EXTENT TYPE    Extent used for searching  
\* WEST LONGITUDE    -159.763181  
\* EAST LONGITUDE    -68.984923  
\* NORTH LATITUDE    47.869994  
\* SOUTH LATITUDE    20.764749  
\* EXTENT CONTAINS THE RESOURCE    Yes

### EXTENT IN THE ITEM'S COORDINATE SYSTEM

\* WEST LONGITUDE    -17784756.006125  
\* EAST LONGITUDE    -7679366.556050  
\* SOUTH LATITUDE    2363849.372681  
\* NORTH LATITUDE    6085253.651333  
\* EXTENT CONTAINS THE RESOURCE    Yes

## Resource Points of Contact

### POINT OF CONTACT

INDIVIDUAL'S NAME Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B.

ORGANIZATION'S NAME Lawrence Berkeley National Laboratory

CONTACT'S ROLE originator

## Resource Maintenance

### RESOURCE MAINTENANCE

UPDATE FREQUENCY quarterly

## Spatial Reference

### ARCGIS COORDINATE SYSTEM

\* TYPE Projected

\* GEOGRAPHIC COORDINATE REFERENCE GCS\_WGS\_1984

\* PROJECTION WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere

\* COORDINATE REFERENCE DETAILS

#### PROJECTED COORDINATE SYSTEM

WELL-KNOWN IDENTIFIER 102100

X ORIGIN -22041258.62706707

Y ORIGIN -33265068.604224768

XY SCALE 135385249.94349548

Z ORIGIN -100000

Z SCALE 10000

M ORIGIN -100000

M SCALE 10000

XY TOLERANCE 0.001

Z TOLERANCE 0.001

M TOLERANCE 0.001

HIGH PRECISION true

LATEST WELL-KNOWN IDENTIFIER 3857

WELL-KNOWN TEXT PROJCS["WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere",GEOGCS

["GCS\_WGS\_1984",DATUM["D\_WGS\_1984",SPHEROID

["WGS\_1984",6378137.0,298.257223563]],PRIMEM["Greenwich",0.0],UNIT

["Degree",0.0174532925199433]],PROJECTION["Mercator\_Auxiliary\_Sphere"],PARAMETER

["False\_Easting",0.0],PARAMETER["False\_Northing",0.0],PARAMETER

["Central\_Meridian",0.0],PARAMETER["Standard\_Parallel\_1",0.0],PARAMETER

["Auxiliary\_Sphere\_Type",0.0],UNIT["Meter",1.0],AUTHORITY["EPSG",3857]]

### REFERENCE SYSTEM IDENTIFIER

\* VALUE 3857

\* CODESPACE EPSG

\* VERSION 8.8(9.3.1.2)

## Spatial Data Properties

### VECTOR

\* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

### GEOMETRIC OBJECTS

FEATURE CLASS NAME solar\_pv\_database\_231108\_v1

\* OBJECT TYPE composite

\* OBJECT COUNT 3,699

#### ARCGIS FEATURE CLASS PROPERTIES

FEATURE CLASS NAME solar\_pv\_database\_231108\_v1  
\* FEATURE TYPE Simple  
\* GEOMETRY TYPE Polygon  
\* HAS TOPOLOGY FALSE  
\* FEATURE COUNT 3699  
\* SPATIAL INDEX TRUE  
\* LINEAR REFERENCING TRUE

## Distribution

#### DISTRIBUTION FORMAT

\* NAME File Geodatabase Feature Class

## Fields

#### DETAILS FOR OBJECT solar\_pv\_database\_231108\_v1 ►

\* TYPE Feature Class  
\* ROW COUNT 3699

#### FIELD OBJECTID

\* ALIAS OBJECTID  
\* DATA TYPE OID  
\* WIDTH 4  
\* PRECISION 0  
\* SCALE 0  
\* FIELD DESCRIPTION  
Internal feature number.  
  
\* DESCRIPTION SOURCE  
Esri

\* DESCRIPTION OF VALUES  
Sequential unique whole numbers that are automatically generated.

#### FIELD Shape

\* ALIAS Shape  
\* DATA TYPE Geometry  
\* WIDTH 0  
\* PRECISION 0  
\* SCALE 0  
\* FIELD DESCRIPTION  
Feature geometry.  
  
\* DESCRIPTION SOURCE  
Esri  
  
\* DESCRIPTION OF VALUES  
Coordinates defining the features.

#### FIELD case\_id

\* ALIAS Case ID  
\* DATA TYPE Integer  
\* WIDTH 4  
\* PRECISION 0  
\* SCALE 0  
\* FIELD DESCRIPTION  
unique stable identification number. Producer defined.

DESCRIPTION SOURCE  
LBNL

FIELD multi\_poly

- \* ALIAS Site Has Discontinuous Areas
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

indicates the facility's polygon type, single or multi. Single— facility is represented by a single part polygon. Multi— facility is represented by multipart polygon composed of at least two discontinuous polygons, sharing a single record. Producer defined.

DESCRIPTION SOURCE

LBNL

FIELD eia\_id

- \* ALIAS EIA Form 860 ID

- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

unique facility identifier from EIA Form 860 for cross-reference to the EIA Links to EIA plant\_code found in the CSV datasets d at <https://www.eia.gov/electricity/data/eia860/>.

DESCRIPTION SOURCE

LBNL

FIELD p\_state

- \* ALIAS State
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

postal 2 letter state abbreviation in which a point representation of LSPV facility is located is computed in ArcMap using US Census / US Postal Service maps from <http://www.census.gov/tiger/tms/gazetteer/zips.txt>

DESCRIPTION SOURCE

U.S. Census

FIELD p\_county

- \* ALIAS County
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

name of county in which a point representation of the LSPV facility is located is computed in ArcMap using U.S Census maps [https://www.census.gov/geo/maps-data/data/cbf/cbf\\_counties.html](https://www.census.gov/geo/maps-data/data/cbf/cbf_counties.html)

DESCRIPTION SOURCE

U.S. Census

#### FIELD ylat

- \* ALIAS Latitude
- \* DATA TYPE Double
- \* WIDTH 8
- \* PRECISION 0
- \* SCALE 0

#### FIELD DESCRIPTION

latitude of a point representation of the LSPV facility's location, in decimal degrees, calculated in ArcMap using the calculate geometry tool with North American 1983 (NAD 83) coordinate system. Representative points are a single point intended to reflect the location of facility panels as accurately as possible. For single-array facilities, values are calculated in the center of the array. For multi-part polygons, values are generated within the array that is closest to the centroid of the multipart polygon. Producer defined.

#### DESCRIPTION SOURCE

LBNL

#### FIELD xlong

- \* ALIAS Longitude
- \* DATA TYPE Double
- \* WIDTH 8
- \* PRECISION 0
- \* SCALE 0

#### FIELD DESCRIPTION

longitude of a point representation of the LSPV facility's location, in decimal degrees, calculated in ArcMap using the calculate geometry tool with North American 1983 (NAD 83) coordinate system. Representative points are a single point intended to reflect the location of facility panels as accurately as possible. For single-array facilities, values are calculated in the center of the array. For multi-part polygons, values are generated within the array that is closest to the centroid of the multipart polygon. Producer defined.

#### DESCRIPTION SOURCE

LBNL

#### FIELD p\_area

- \* ALIAS Facility Array Area (sq m)
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

#### FIELD DESCRIPTION

area of the facility array(s) in square meters (sq m), calculated in ArcMap with the calculate geometry tool with Albers Equal Area Conic projection. This area only includes facility panels and inverters and does not include buildings, facility fence lines, nor the full disturbed area. Producer defined.

#### DESCRIPTION SOURCE

LBNL

#### FIELD p\_img\_date

- \* ALIAS Confirmation Image Date
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

#### FIELD DESCRIPTION

acquisition date of the aerial image used to confirm the facility location and geometry in yyyymmdd format, From aerial image vendor (Maxar) metadata.

DESCRIPTION SOURCE  
LBNL

FIELD p\_dig\_conf

- \* ALIAS Location Confidence (1=Low, 4=High)
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

level of confidence in site location from 1 to 4. Lower values represent a lower confidence. 1— Multiphase facility or multiple EIA records with identical location. Single polygon used to represent multiple facilities indistinguishable from one another; attributes may not reflect full scope of facilities. 2—Multiple polygons created, but EIA records are unclear; attributes may not reflect full scope of facilities. 3— Polygon reflects only a part of the facility due to poor image quality; area of polygon may not reflect the full size of array(s). 4— Facility polygons created with high confidence.

DESCRIPTION SOURCE  
LBNL

FIELD p\_name

- \* ALIAS Name
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

Name of facility

FIELD p\_year

- \* ALIAS Year Operational
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

year in which facility operation began from EIA Form 860

DESCRIPTION SOURCE  
LBNL

FIELD p\_pwr\_reg

- \* ALIAS Power Regulation Organization
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

Power Regulation Organization

DESCRIPTION SOURCE  
LBNL



FIELD p\_tech\_pri

- \* ALIAS Generation Technology Type
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

electric generation technology type (e.g., PV) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_tech\_sec

- \* ALIAS Panel Type
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

additional detail on panel type (e.g., thin film, c-Si) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_axis

- \* ALIAS Axis Type
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

array axis type (e.g., single axis) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_azimuth

- \* ALIAS Array Orientation Azimuth
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

array azimuth (i.e., east-west orientation in degrees) from EIA Form 860; records with no data were recorded as -9999

DESCRIPTION SOURCE

LBNL

FIELD p\_tilt

- \* ALIAS Panel Tilt (degrees)
- \* DATA TYPE Integer
- \* WIDTH 4
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

tilt angle of panels (i.e., angle of panels from horizontal in degrees) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_battery

- \* ALIAS Has Battery Storage
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

indicator of the presence of battery storage at the facility from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_cap\_ac

- \* ALIAS Facility Capacity (MW AC)
- \* DATA TYPE Double
- \* WIDTH 8
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

facility capacity in megawatts AC (Alternating Current) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_cap\_dc

- \* ALIAS Facility Capacity (MW DC)
- \* DATA TYPE Double
- \* WIDTH 8
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

facility capacity in megawatts DC (Direct Current) from EIA Form 860

DESCRIPTION SOURCE

LBNL

FIELD p\_type

- \* ALIAS Site Type
- \* DATA TYPE String
- \* WIDTH 254
- \* PRECISION 0
- \* SCALE 0

FIELD DESCRIPTION

general categorization of facility from the EPA's RE-Powering Matrix ("Matrix dataset")

Resource Conservation and Recovery Act (RCRA) - sites are a specific category of commercial, industrial and federal facilities that treat, store or dispose of hazardous wastes and that require cleanup under the RCRA Hazardous Waste Corrective Action Program. Taken directly from the Matrix dataset

superfund - Superfund sites are inactive or abandoned contaminated facilities or locations where there is an active release or threatened release into the environment of hazardous substances that have been dumped, discharged, emitted or otherwise improperly managed. These sites may include manufacturing and industrial facilities, processing plants, landfills and mining sites, among others. Taken directly from the Matrix dataset

AML - Abandoned Mine Land sites include abandoned hardrock mines and mineral processing sites listed in the Superfund Enterprise Management System (SEMS) at this time. Taken directly from the Matrix dataset

landfill - These sites have been designated as landfills in EPA's RE-Powering Matrix. Taken directly from the Matrix dataset

PCSC - When no specific designation is provided in the Matrix dataset, ""brownfield"" sites were assigned to a generalized PCSC (Previous, current or suspected contamination) facility type

landfill Named - This site type was assigned in cases where EPA did not identify the site as a landfill, but the facility name includes the word "landfill." It is possible that these sites have been sufficiently cleaned or were never contaminated to the point of meeting the PCSC designation; they are thus distinguished from EPA designated landfill sites

greenfield - Greenfield facilities encompass the remainder of LSPV facilities that do not fall into one of the other named categories. Greenfield sites represent the majority of LSPV facilities and occupy land that may have previously been wildland, urbanized, cultivated, or reclaimed. Populated from EPA's Repowering Matrix (LINK please) and producer adjusted as described.

DESCRIPTION SOURCE

LBNL

FIELD **p\_agrivolt**

\* ALIAS Has Agrivoltaic Use/Services

\* DATA TYPE String

\* WIDTH 254

\* PRECISION 0

\* SCALE 0

FIELD DESCRIPTION

Agrivoltaic facilities make use of the land between panel rows and surrounding arrays for agricultural uses (i.e., crop production or grazing) and/or ecosystem services (e.g., pollinator habitat). Agrivoltaic sites are categorized into the following designations: Crop, Crop\_ES, ES, Grazing, Grazing\_ES, Non-Agrivoltaic.  
[https://openei.org/wiki/InSPIRE/Agrivoltaics\\_Map](https://openei.org/wiki/InSPIRE/Agrivoltaics_Map)

DESCRIPTION SOURCE

LBNL

FIELD **p\_zscore**

\* ALIAS Z-Score: Ratio of DC Capacity/Facility Area

\* DATA TYPE Single

\* WIDTH 4

\* PRECISION 0

\* SCALE 0

FIELD DESCRIPTION

The z-score of the ratio of facility capacity (in DC) and facility area (p\_cap\_dc/p\_area). A z-score measures how far a record is from the mean of all records in the field in units of standard deviations. Records with high or low Z-scores may have an error in either p\_cap\_dc or p\_area. Producer Defined.

DESCRIPTION SOURCE

LBNL

FIELD **Shape\_Length**

\* ALIAS Shape\_Length

\* DATA TYPE Double

\* WIDTH 8

\* PRECISION 0

\* SCALE 0

\* FIELD DESCRIPTION

Length of feature in internal units.

\* DESCRIPTION SOURCE

Esri

\* DESCRIPTION OF VALUES

Positive real numbers that are automatically generated.

#### FIELD Shape\_Area

\* ALIAS Shape\_Area

\* DATA TYPE Double

\* WIDTH 8

\* PRECISION 0

\* SCALE 0

\* FIELD DESCRIPTION

Area of feature in internal units squared.

\* DESCRIPTION SOURCE

Esri

\* DESCRIPTION OF VALUES

Positive real numbers that are automatically generated.

## Metadata Details

\* METADATA LANGUAGE English (UNITED STATES)

\* METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

SCOPE OF THE DATA DESCRIBED BY THE METADATA \* dataset

SCOPE NAME \* dataset

\* LAST UPDATE 2023-11-14

#### ARCGIS METADATA PROPERTIES

METADATA FORMAT ArcGIS 1.0

METADATA STYLE FGDC CSDGM Metadata

STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2023-11-14

LAST MODIFIED IN ARCGIS FOR THE ITEM 2023-11-14

#### AUTOMATIC UPDATES

HAVE BEEN PERFORMED Yes

LAST UPDATE 2023-11-14

## Metadata Contacts

#### METADATA CONTACT

INDIVIDUAL'S NAME Fujita, K.S., Ancona, Z.H., Kramer, L.A., Straka, M., Gautreau, T.E., Garrity, C.P., Robson, D., Diffendorfer, J.E., and Hoen, B.

ORGANIZATION'S NAME Lawrence Berkeley National Laboratory

CONTACT'S ROLE originator

## Metadata Maintenance

#### MAINTENANCE

UPDATE FREQUENCY unknown