

Database for Solar Radiation in Asia  
User Manual

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## Chapter 1: Introduction

During NEDO's International Cooperative Demonstration Project Utilizing Photovoltaic Power Generation Systems: Development of Design Support Tools for Photovoltaic Power Generation Systems ("PROJECT"), the Japan Weather Association collected data and developed a database on solar radiation in Asia. This manual is designed to guide users through various functions of the database.

An overview of the database is summarized in Table 1-1.

The database has a search function that allows users to easily retrieve data. In order to make the database available to many people, the language used in the database can be switched between Japanese and English. The computer configuration described below is recommended for using the database.

Operating system	Microsoft Windows 10 (Japanese version)
Browser	Google Chrome, Microsoft Edge
Screen resolution	1024 x 768 pixels or greater
Internet connection	Communication speed 10 Mbps or more (recommended)

The screen shown in this manual is an example when displayed on Google Chrome. Please note that the display may differ depending on the environment. In addition, NEDO and the Japan Weather Association shall not be liable for any damages caused by the use of the data files and the software posted on the NEDO homepage.

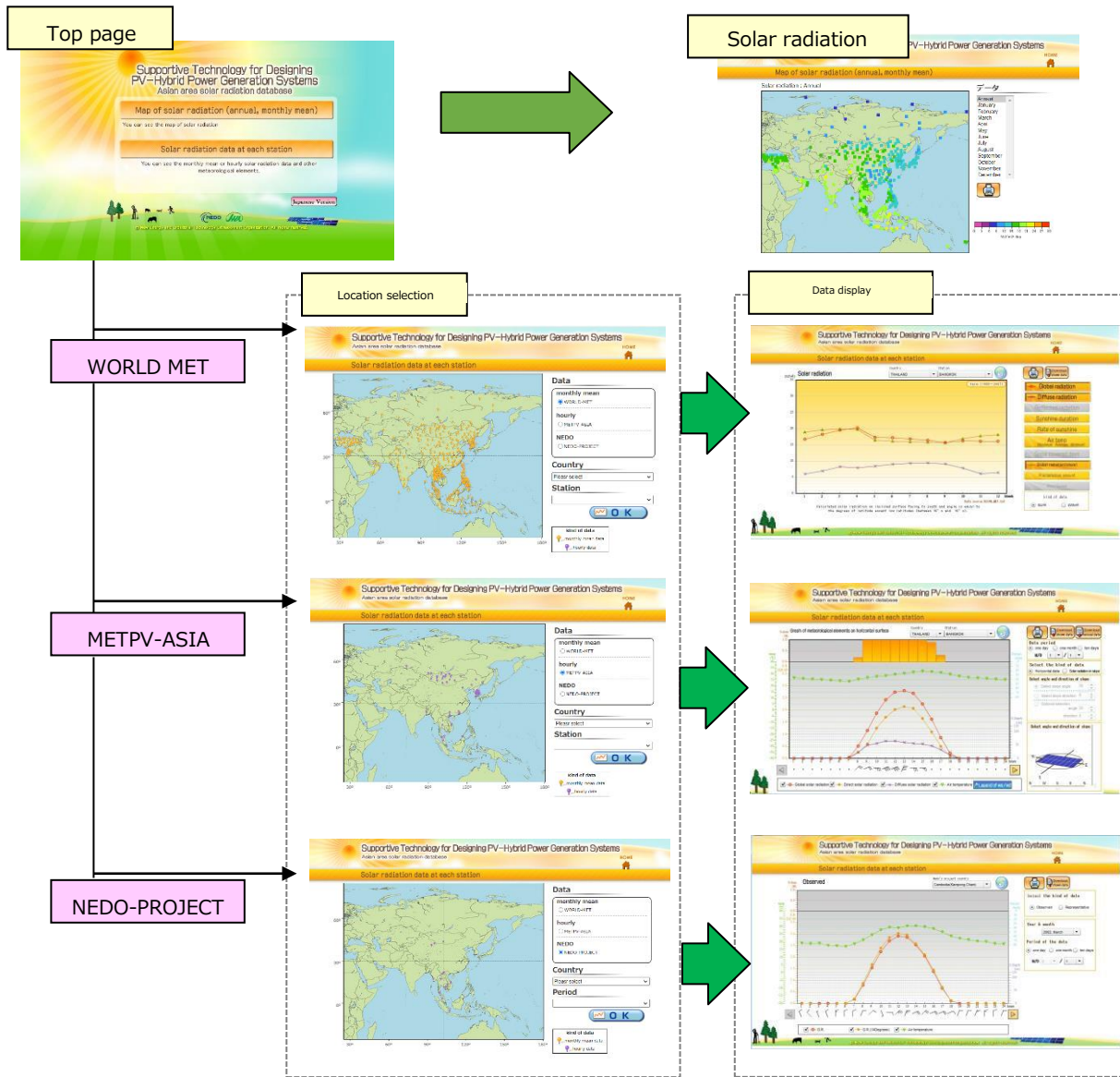
Table 1-1 Overview of Database for Radiation in Asia

Data available	Monthly mean data (WORLD MET)	(1) Data excerpted from the world weather database that was developed in NEDO's activities (data available locations: 350)
		(2) Data for Asian regions calculated based on data from the World Radiation Data Center, with additional data on temperature, precipitation, and wind speed (data available locations: 80)
		(3) Data generated from meteorological data collected in the PROJECT (data available locations: 82)
	Hourly data (METPV-ASIA)	(1) Data developed for Asian regions based on METPV-11 (data available locations: 49)
	NEDO project-related data (NEDO-PROJECT)	(2) Data compiled from meteorological data collected in NEDO's demonstration projects in Asia (data available locations: 13)
Database function overview	<p>The database is designed to provide users with the following data:</p> <ul style="list-style-type: none"> <li>(1) A map with data on monthly mean solar radiation</li> <li>(2) Monthly mean solar radiation data shown by location</li> <li>(3) Hourly solar radiation data shown by location</li> <li>(4) Downloadable data</li> </ul> <p>Data can be downloaded and edited by users.</p>	

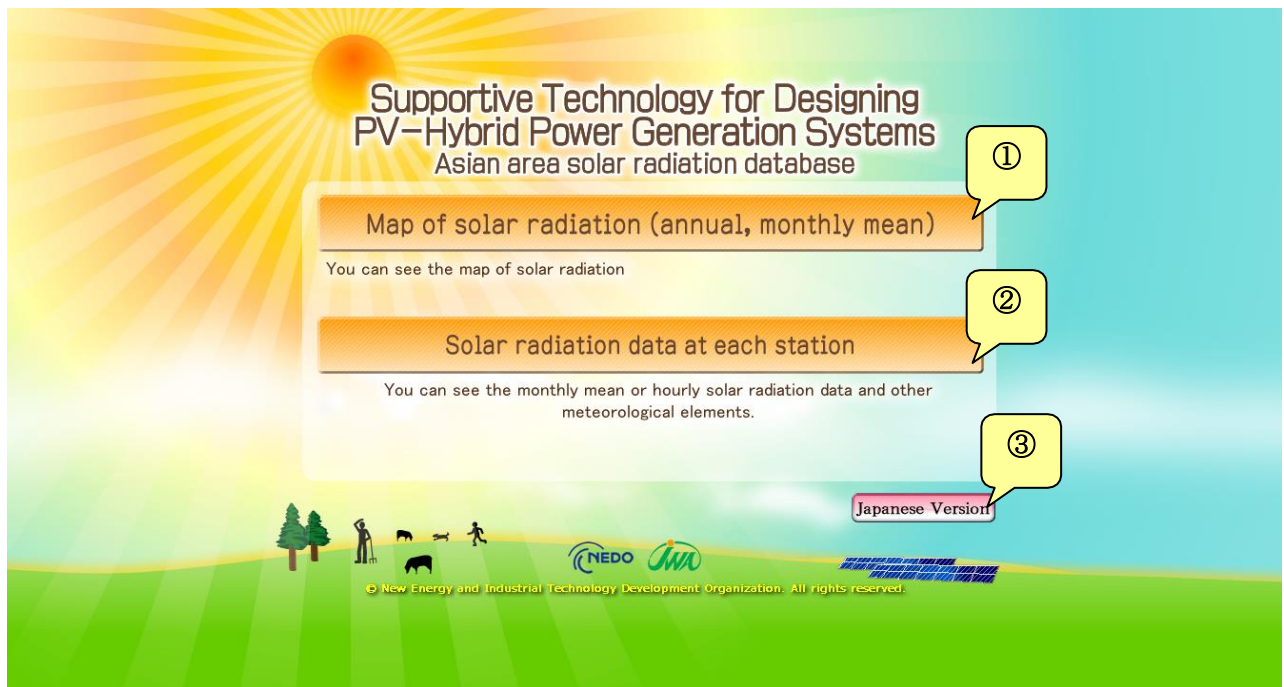
# Chapter 2: Database Key Functions

## 2-1: Configuration

The database has the following configuration:

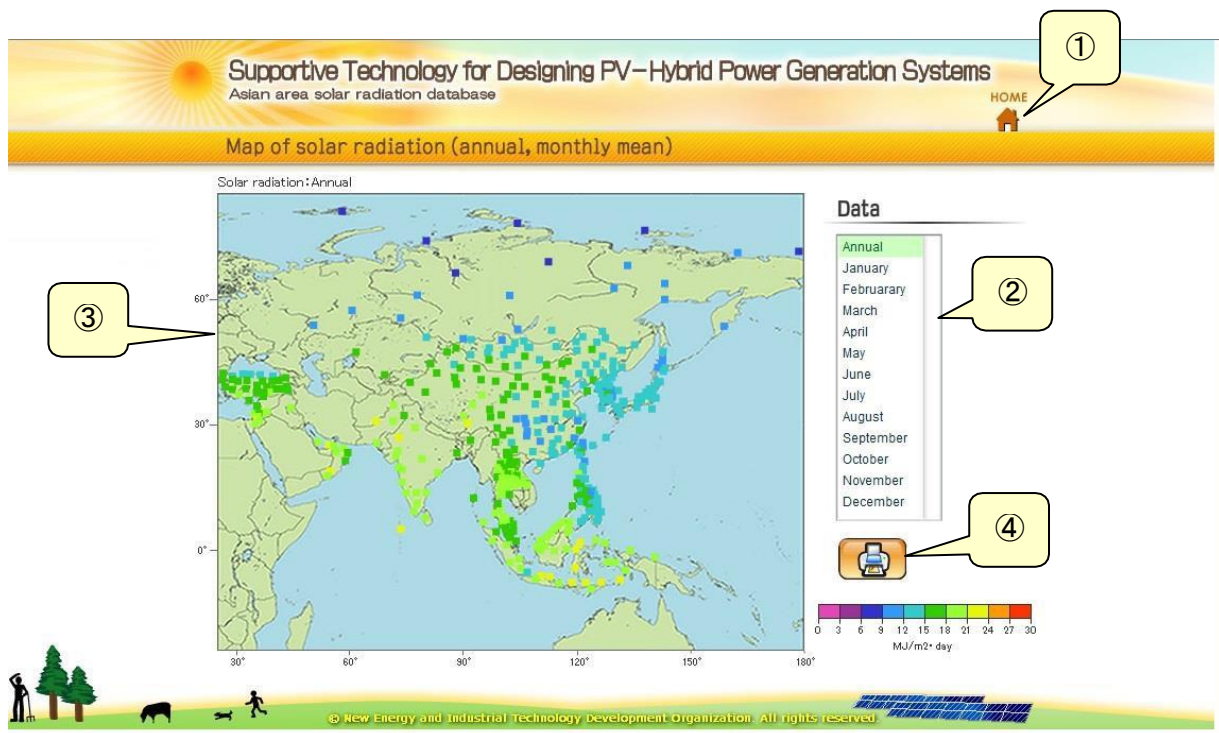


## 2-2: Top page



- ① Map of solar radiation (annual, monthly mean): select this option to view a map with data on solar radiation.
- ② Solar radiation data at each station: select this option to view solar radiation data sorted by location.
- ③ Click the icon to switch between Japanese and English versions.

## 2-3: Map of solar radiation (annual, monthly mean)



- ① Click the home icon to go back to the top page.
- ② Select “Annual” or a month in the data section to display data on the map.
- ③ The color of each small square on the map indicates the amount of average solar radiation. Refer to the color scale under the printer icon.
- ④ Click the icon to print the displayed map.

## 2-4: Solar radiation data at each station

### 2-4-1: Selecting a location

The page shown below will be displayed after clicking the “Solar radiation data at each station” option on the top page.

- ① Click the home icon to go back to the top page.
- ② Select a data type given in the data section. By default, WORLD-MET is selected. Refer to the table below for details of data types. After selecting a country and a station given in each dropdown menu, a graph will be displayed. Instructions on how to select a location will be provided on the next page.

Data type	Data name	Outline
Monthly mean data	WORLD-MET	Monthly average of meteorological data collected in Asian regions
Hourly data	METPV-ASIA	Hourly meteorological data collected for a year in Asian regions
NEDO project-related data	NEDO-PROJECT	Hourly meteorological data collected in NEDO's international projects



## (1) Selecting a location in Asian regions

The map shown below will be displayed after checking “WORLD-MET,” “METPV-ASIA” and “NEDO-PROJECT” in the data section.

**Map of Asian regions**

**Data**

monthly mean  
 WORLD-MET

hourly  
 METPV-ASIA

NEDO  
 NEDO-PROJECT

**Country**

Please select

**Station**



kind of data  
 monthly mean data  
 hourly data

**Enlarged map**

国名: INDONESIA  
地点名: TUAL

back

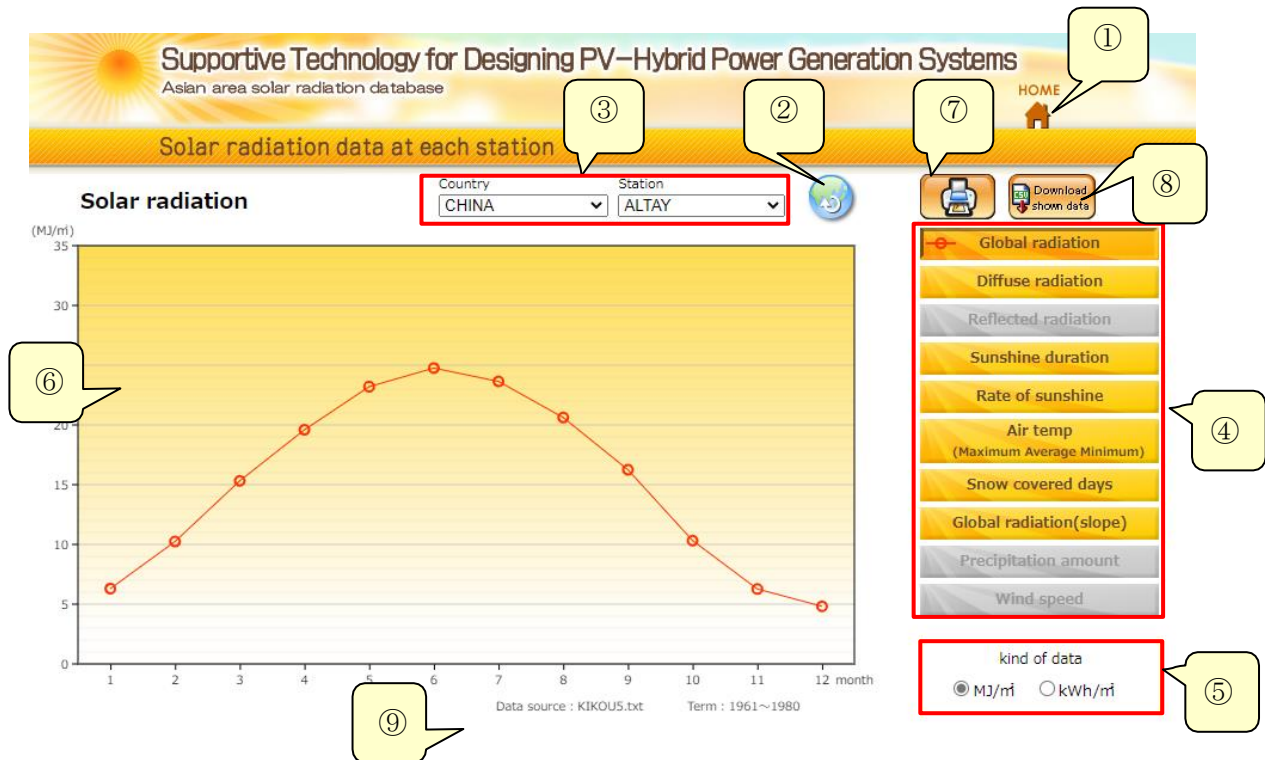
kind of data  
 monthly mean data  
 hourly data

- ① The map of Asian regions is divided into four parts. Each part can be enlarged by moving the cursor onto it (the color will change to pale yellow) and clicking it.
- ② When clicking the  icon on the map, a pop-up window containing location information will appear. Click the  button in the pop-up to display a graph.
- ③ Click the icon to go back to the map of Asian regions.
- ④ A location can also be selected by using dropdown menus in the indicated section.

## 2-4-2 : Monthly mean data from WORLD-MET

### (1) Displaying data

A graph will be displayed after selecting a location as described in 2-4-1. An example is shown below.



- ① Click the home icon to go back to the top page.
- ② Click the icon to go back to the location selection page.
- ③ Use dropdown menus in the indicated section to change a location.
- ④ Select and click on the data element(s) you want to see in the indicated section. Unavailable data elements are grayed out.
- ⑤ A unit of radiation can be switched between MJ/m<sup>2</sup> and kWh/m<sup>2</sup>.
- ⑥ A graph based on your selection is shown.
- ⑦ The displayed graph can be printed by clicking the icon. When printing, use A4 paper in landscape orientation.
- ⑧ Data in the displayed graph can be downloaded by clicking the icon. Refer to the next section for details on how to download data.
- ⑨ A data source is displayed. For example, "KIKOU5.txt" is the source of data in the graph shown above.

## (2) Downloading data

- Data from WORLD-MET

A file containing data from WORLD-MET is named as follows:

worldmet\_#####.csv

Note that “#####” is replaced with a location number of six digits.

When clicking the “Download shown data” icon as described on the previous page, a text file of data in the displayed graph will be downloaded.

An example of a text file is shown below. The example’s data source is KIKOU5.txt. As a location number of 208006 was given in KIKOU5.txt, a text file will be named worldmet\_208006.txt when downloaded from the database.

Location information	Element numbers	Annual statistics	Year when data collection started	Number of years of data collection
208006CHINA	1	47440	88056	737
208006	2	23.200	24.760	23.640
208006	3	20.620	16.250	10.320
208006	4	6.270	4.820	15.111
208006	5	15.111	1961	1980
208006	6	30+		
208006	7	1961	1980	30+
208006	8	1961	1980	30+
208006	9	1961	1980	30+
208006	10	1961	1980	30+

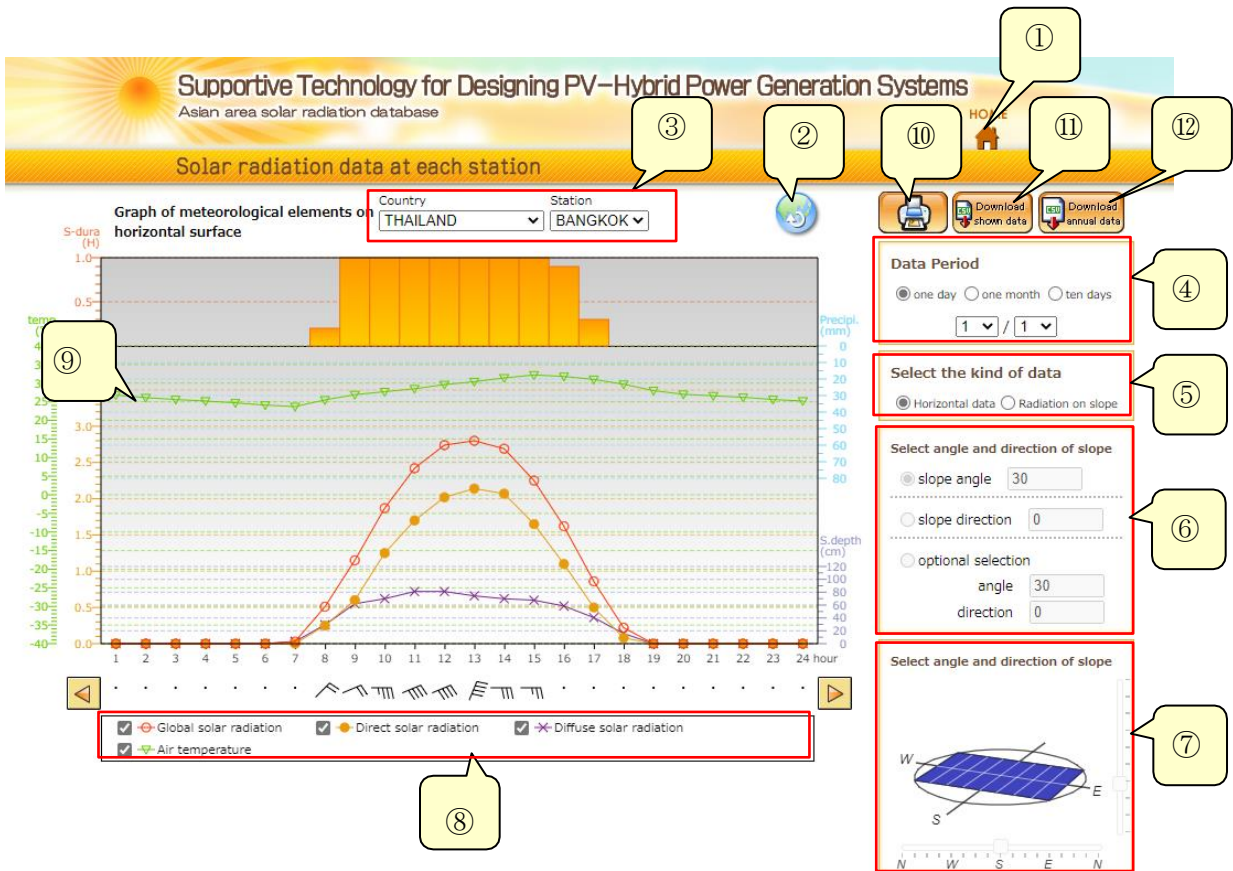
Details and order of meteorological data contained in KIKOU5.txt are as follows:

Location information	Location number, country, location name, latitude, longitude, altitude (meters)
Global horizontal radiation	Location number, element number: 1, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Diffuse horizontal radiation	Location number, element number: 2, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Radiation reflected from ground	Location number, element number: 3, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Monthly sunshine in hours	Location number, element number: 4, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Sunshine rate	Location number, element number: 5, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Mean temperature	Location number, element number: 6, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Monthly mean maximum temperature	Location number, element number: 7, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Monthly mean minimum temperature	Location number, element number: 8, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Number of snowy days	Location number, element number: 9, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection
Slope radiation	Location number, element number: 10, data collected each month from January to December, annual statistic, year when data collection started, year when data collection ended, number of years of data collection

## 2-4-3 : Hourly data from METPV-ASIA

### (1) Displaying data

A graph will be displayed after selecting a location as described in 2-4-1. An example is shown below.



- ① Click the home icon to go back to the top page.
- ② Click the icon to go back to the location selection page.
- ③ Use dropdown menus in the indicated section to select a location.
- ④ The data collection period can be selected from one day, one month, and ten days. Use dropdown menus in the indicated section to specify a start date of the period.
- ⑤ Two different data types can be shown. "Horizontal data" is data collected on a horizontal plane and "Solar radiation on slope" is data collected at different slope positions.
- ⑥ When choosing "Solar radiation on slope" in ⑤, an angle and a direction can also be selected as described below.

**Select the kind of data**

Horizontal data  Solar radiation on slope

**Select angle and direction of slope**

Select slope angle

Select slope direction

Optional selection

angle

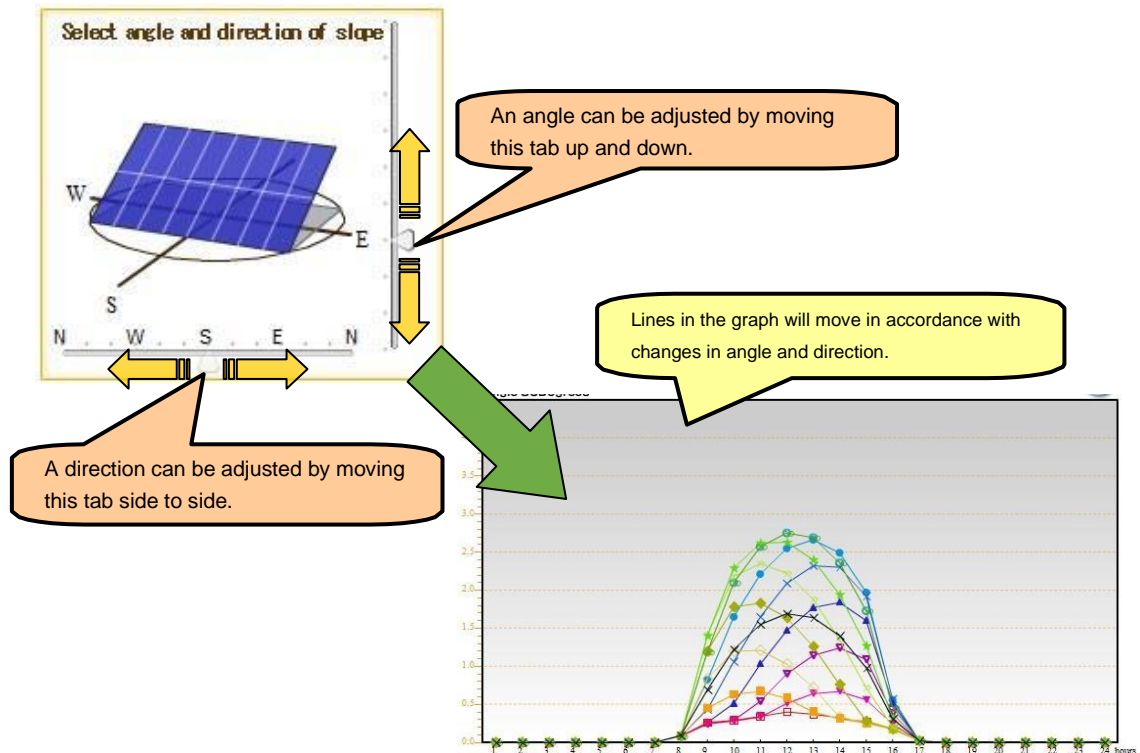
direction

Select slope angle: an angle can be selected from 0° to 90° in increments of 1°.

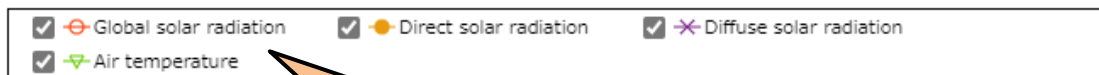
Select slope direction: a direction can be selected from 0° to 359° in increments of 1°. South, west, north, and east are indicated as 0°, 90°, 180° and 270°, respectively.

Optional selection: both an angle and a direction can be selected in increments of 1°.

- ⑦ When choosing "Solar radiation on slope" in ⑤, an angle and a direction can also be adjusted by moving tabs in the section shown below.



- ⑧ In the graph legend, each data element can be made visible or invisible. The example of the graph legend shown below is for data collected on a horizontal plane.



Each type of data can be made visible or invisible by checking or unchecking the checkboxes.

- ⑨ A graph based on your selection is shown.
- ⑩ The displayed graph can be printed by clicking the icon. When printing, use A4 paper in landscape orientation.
- ⑪ Data in the displayed graph can be downloaded by clicking the icon. When choosing “Solar radiation on slope” in ⑤ and further selecting either an angle or a direction in ⑥, data for only one day can be downloaded.
- ⑫ Annual data in the displayed graph can be downloaded by clicking the icon. In order to download annual data for slope radiation, select both an angle and a direction in ⑥. Refer to the next page for details on how to download data.

## (2) Downloading data

### ① Data on horizontal radiation

A file containing data on horizontal radiation is named as follows:

hmppppppmm(dd).csv

“hm” indicates that the file contains horizontal radiation data.

“pppppp” is replaced with a location number of six digits if data is from METPV-ASIA.

“mm(dd)” is replaced with the month (and the day) when data was collected, and it is replaced with “year” for a text file containing annual data.

For example, data in the graph shown on page 10 is horizontal radiation data collected at BANGKOK in Thailand, whose location number is 235010. When the data is downloaded, each text file will be named depending on the data collection period as follows:

Data collection period	File name	Remarks
One day	hm2350100101.csv	Data collected on January 1
One month	hm23501001.csv	Data collected from January 1 to 31
One year	hm235010year.csv	Data collected from January 1 to December 31

As an example, the top part of hm23501001.csv (a text file of data collected for a month) is shown below.

235010BANGKOK																																
Element numbers	Month	Day	Height of anemometer	Data collected at 01:00	Data collected at 02:00																							Days from Jan 1st				
1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
5	1	1	0	268	261	256	252	247	241	237	235	229	277	285	296	304	314	322	318	310	297	280	270	266	262	256	252	322	252	8888	285	1
6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
19	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
22	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
23	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
24	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
25	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
28	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
29	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
30	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Location information	Location number, location name, latitude, longitude, altitude (meters)
Horizontal radiation	Element number: 1, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Horizontal direct radiation	Element number: 2, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Horizontal diffuse radiation	Element number: 3, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Hours of sunshine	Element number: 4, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Temperature	Element number: 5, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection

Wind direction	Element number: 6, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Wind speed	Element number: 7, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Amount of precipitation	Element number: 8, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Number of snowy days	Element number: 9, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection

## ② Data on slope radiation

Depending on your selection of an angle and a direction, downloadable data is limited as follows:

	Data for			Annual data
	One day	One month	Ten days	
Selecting an angle	○	○	○	×
Selecting a direction	○	○	○	×
Selecting both an angle and a direction	○	○	○	○

(○: Downloadable, ×: Impossible to be downloaded)

Files containing data on slope radiation are named as follows:

- When selecting an angle:  
rmppppppmm(dd)\_stt\_30.csv (the number 30 indicates that a file contains data collected at a selected angle and at different azimuth angles from 0° to 330° in increments of 30°.)
- When selecting a direction:  
rmppppppmm(dd)\_dtt\_10.csv (the number 10 indicates that a file contains data collected at a selected direction and at different slope angles from 0° to 90° in increments of 10°.)
- When selecting both an angle and a direction:  
rmppppppmm(dd)\_dttstt.csv

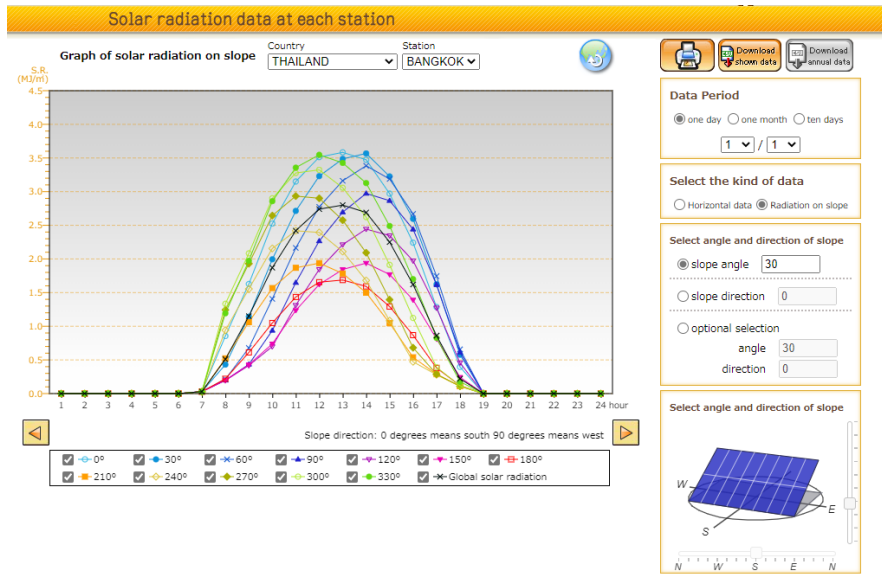
“pppppp” is replaced with a location number of six digits if data is from METPV-ASIA.

“mm(dd)” is replaced with the month (and the day) when data was collected, and it is replaced with “year” for a text file containing annual data.

“tt” is replaced with a selected angle, and “s” before “tt” stands for slope angle.

“ttd” is replaced with a selected direction, and “d” before “ttd” stands for direction.

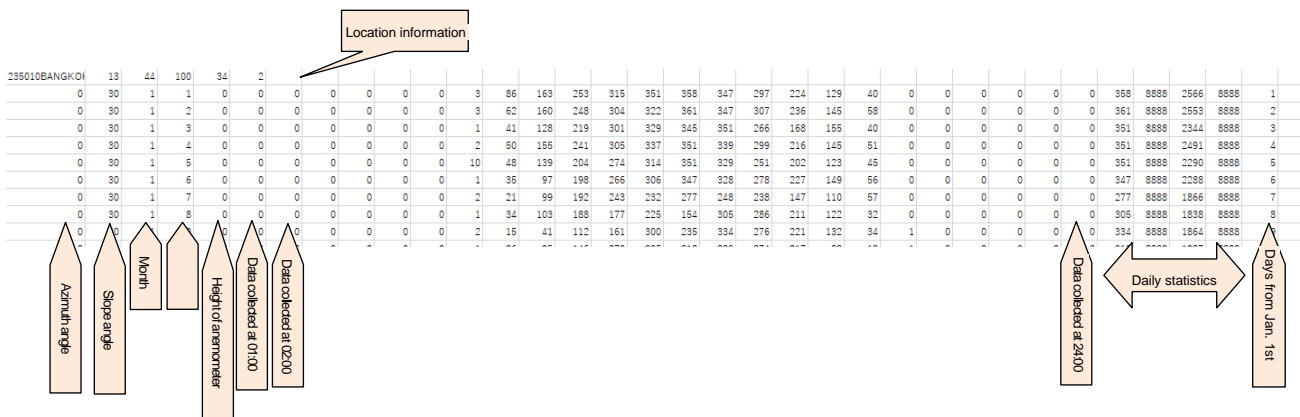
For example, data in the displayed graph shown on the next page is slope radiation data collected at BANGKOK in Thailand, whose location number is 235010.



When the data is downloaded, each text file will be named depending on the data type as follows:

Data type	File name	Remarks
Selecting an angle	rm2350100101_s30_30.csv	Data collected on January 1 at a slope angle of 30° and at different azimuth angles from 0° to 330° in increments of 30°.
Selecting a direction	rm2350100101_d000_10.csv	Data collected on January 1 at an azimuth angle of 0° (south) and at different slope angles from 0° to 90° in increments of 10°.
Selecting both an angle and a direction	rm235010year_d000s30.csv	Data collected for a year from January 1 to December 31 at a slope angle of 30° and at an azimuth angle of 0° (south).

As an example, the top part of rm235010year\_d000\_30.csv (a text file of data collected for a month) is shown below.



The order of meteorological data contained in each file is shown below.

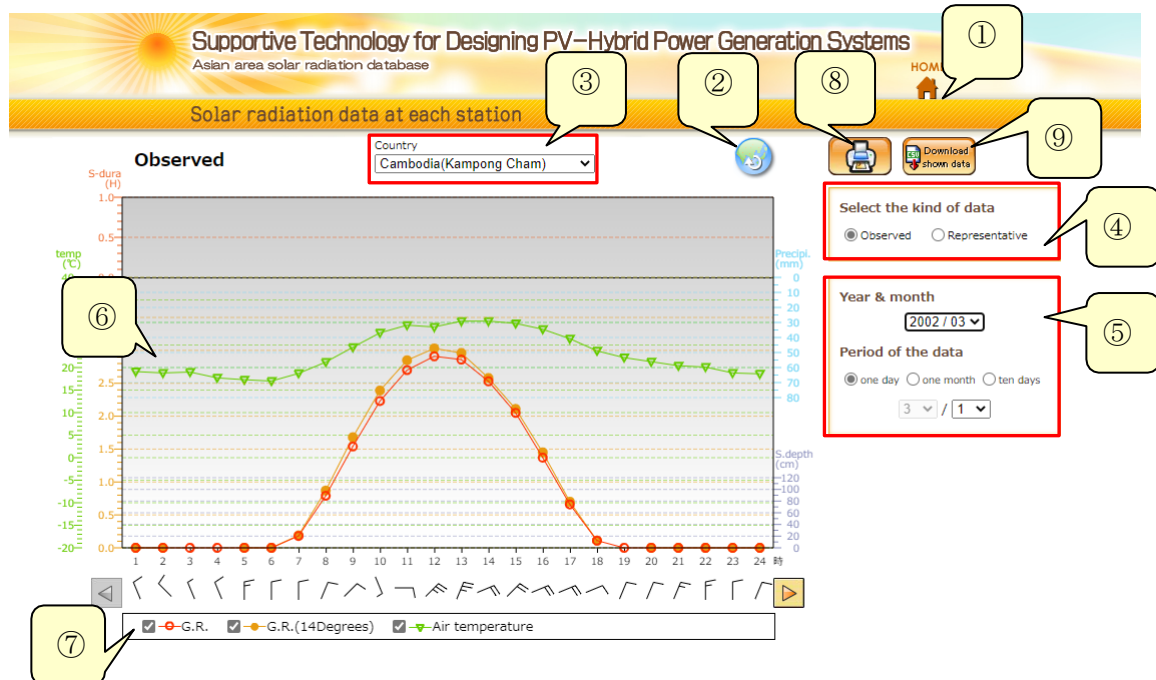


Location information	Location number, location name, latitude, longitude, altitude (meters)
Slope radiation on January 1	Azimuth angle, slope angle, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
Slope radiation on January 2	Azimuth angle, slope angle, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection
.	Same as above
.	
.	
Slope radiation on January 31	Azimuth angle, slope angle, month, day, height of anemometer (meters), data collected each hour from 01:00 to 24:00, daily statistics, total days of data collection

## 2-4-4 : Hourly data collected in NEDO international projects

### (1) Displaying data

A graph will be displayed after selecting a location as described in 2-4-1. An example is shown below.



- ① Click the home icon to go back to the top page.
- ② Click the icon to go back to the location selection page.
- ③ Use the dropdown menu to select a country.
- ④ The following two different data types can be shown: "Observed" and "Representative." Note that only observed type data is available for some countries.
- ⑤ When choosing "Observed" in ④, the data collection period can be selected from one day, one month, and ten days. Use the dropdown menus to specify a start date of the period.
- ⑥ A graph based on your selection is displayed.
- ⑦ In the graph legend, data can be made visible or invisible by checking or unchecking the checkboxes.
- ⑧ The displayed graph can be printed by clicking the icon. When printing, use A4 paper in landscape orientation.
- ⑨ Data in the displayed graph can be downloaded by clicking the icon. Refer to the next page for details on how to download data.

## (2) Downloading data

A file containing data collected in NEDO's international projects is named as follows:

[sssss\(ppppp\) -yyyymm\(dd\).csv](#)

“sssss” is replaced with the name of a selected country.

“ppppp” is replaced with the name of a selected project site.

“yyyy” is replaced with the year when data in the displayed graph were collected.

“mm(dd)” is replaced with the month (and the day) when data in the displayed graph was collected.

For example, data in the graph shown on page 17 was collected in Kampong Cham, Cambodia.

When the data is downloaded, each text file will be named depending on the data collection period as follows:

Data collection period	File name	Remarks
One day	Cambodia (Kampong Cham) -20020301.csv	Data collected on March 1, 2002
One month	Cambodia (Kampong Cham) -200203.csv	Data collected for March 2002

As an example, the top part of Cambodia(Kampong Cham)-200203.csv (a text file of data collected for a month) is shown below.

The order of meteorological data contained in each file is shown below. Only radiation elements were always observed and recorded. Many other elements were not always observed and recorded. The number 99999 will be shown in elements with no data.

Horizontal radiation (MJ/m <sup>2</sup> )	Element number: 1, month, day, data collected each hour from 01:00 to 24:00
Slope radiation (1) (MJ/m <sup>2</sup> )	Element number: 2, month, day, data collected each hour from 01:00 to 24:00
Slope radiation (2) (MJ/m <sup>2</sup> )	Element number: 3, month, day, data collected each hour from 01:00 to 24:00
Sunshine in hours (hours)	Element number: 4, month, day, data collected each hour from 01:00 to 24:00
Temperature (°C)	Element number: 5, month, day, data collected each hour from 01:00 to 24:00
Wind direction (16 directions)	Element number: 6, month, day, data collected each hour from 01:00 to 24:00

Wind speed (m/s)	Element number: 7, month, day, data collected each hour from 01:00 to 24:00
Amount of precipitation (mm)	Element number: 8, month, day, data collected each hour from 01:00 to 24:00
Depth of snow (cm)	Element number: 9, month, day, data collected each hour from 01:00 to 24:00

Note that data on angles for slope radiation can be found in the database.