



**Asia-Pacific  
Economic Cooperation**



Department of Alternative  
Energy Development and Efficiency  
**MINISTRY OF ENERGY**



# **Small and Medium PV System Database in the APEC Region**

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**EGNRET 50  
Honolulu, Hawaii, USA  
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1. To compile, collate, analyze, report, disseminate profiling of small to medium scale PV system information in selected Grid Connected and Off-Grid PV systems.
  - **Compiled Data for 45 PV systems**
2. To initiate a strong institutional network for collecting, updating and maintaining the database for the PV systems in the APEC member economies.
  - **Indonesia, Malaysia, Thailand, United States & Viet Nam**
3. To share the information of small to medium scale PV system status in selected GC and OG PV systems in a common platform as an information cloud sharing environment.
  - **[www.apecpv.cmru.ac.th](http://www.apecpv.cmru.ac.th)**



Develop structure of the database platform & create institutional network



Experience of database usage and way forward with stakeholders, reporting and data analysis

The screenshot shows the PV Database Portal interface. At the top, there is a browser address bar with the URL [apecpv.cmru.ac.th](http://apecpv.cmru.ac.th). The page header includes the APEC logo and the Ministry of Energy logo. A search bar is located in the top right corner.

The main content area is titled "Home Page" and features a section for "Small and Medium PV System Database in the APEC Region". This section contains three data categories, each with an icon and a brief description:

- General PV Information:** General PV Information provides basic data of Asia-Pacific PV installation such as Installed PV Capacity and Nominal Inverter Capacity.
- Monthly PV Information:** Monthly PV Information shows more specific data and monthly power consumption in each PV solar farm. Provided information could be downloaded and used for only study and research.
- Daily PV Information:** Monthly PV Information shows more specific data and monthly power consumption in each PV solar farm. Provided information could be downloaded and used for only study and research.

Below these categories is a world map with a red dot indicating the location of the database. The map includes zoom in (+) and zoom out (-) controls.

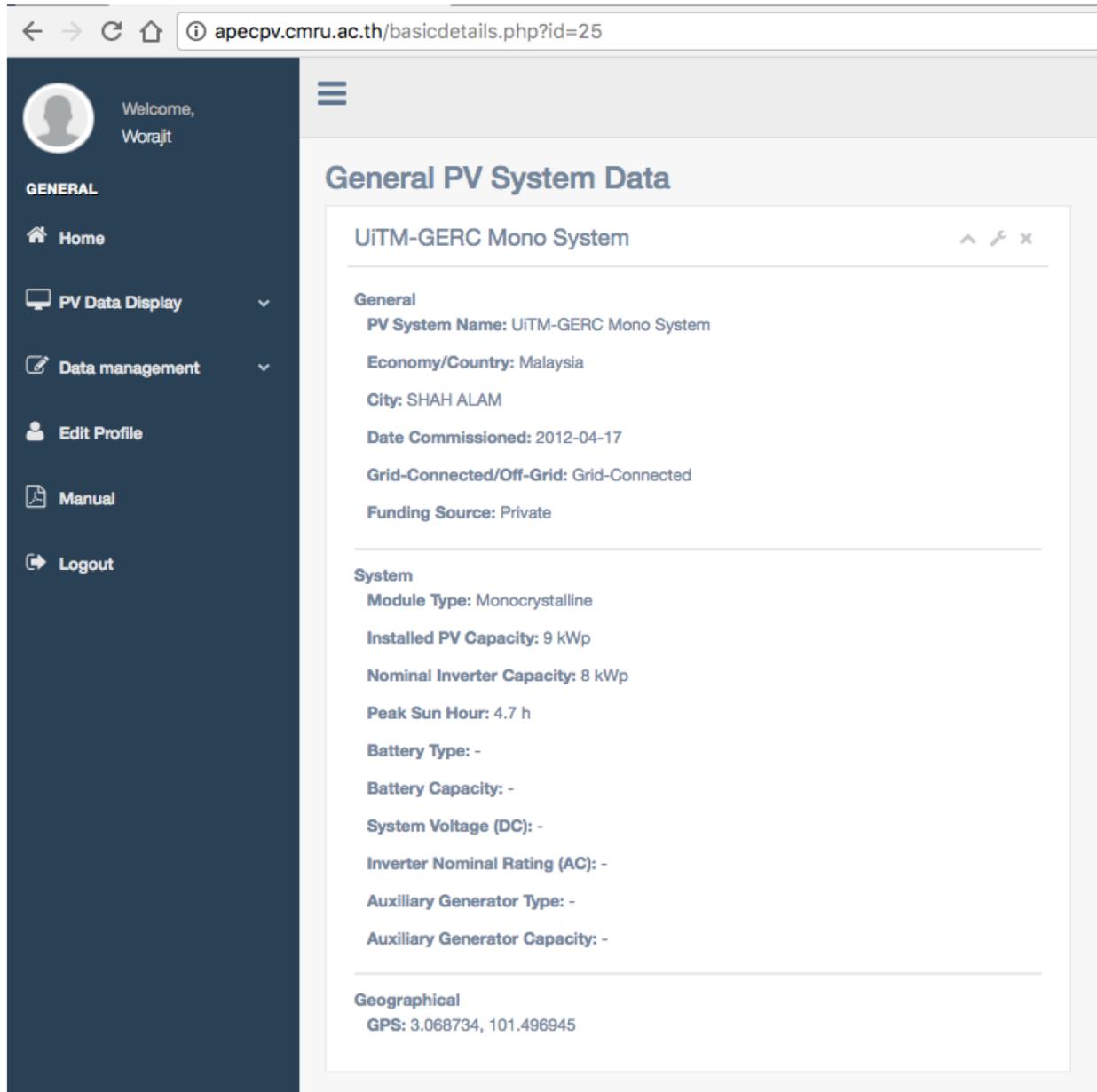
At the bottom of the page, there is a "Contact Us" section with the following information:

**Contact Us**  
**Narakorn Songkittirote**  
 Asian Development College for Community Economy and Technology  
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 Email: [Songkittirote.n@gmail.com](mailto:Songkittirote.n@gmail.com)  
 Facebook: [adicetfan](https://www.facebook.com/adicetfan)

The footer of the page displays logos for various partner institutions: adiCET, NCUT (National Central University), Universiti Teknologi MARA, University of Phayao, and HNEI (Hanoi Energy Institute).

Economy	PV System Name	Size (kWp)	Grid-Connected/Off-Grid	General PV Data	Monthly PV Data	Daily PV Data
Indonesia	IFC Rooftop	26	Grid-Connected	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Indonesia	Kolorai Island	1.86	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Indonesia	JATENGS06	15	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Indonesia	MALS11	50	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	UITM-GERC Mono System	9	Grid-Connected	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	UITM-GERC Poly System	5	Grid-Connected	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	UITM-GERC Thin Film	1	Grid-Connected	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Telok Melano	66.3	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Arur Dalan	56	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Semadoh Naseb	106.92	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Kajang	69	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Lusung Laku, Balanga	226.8	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Sukang, Lawas	238.14	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Rumah Dau Sri Aman	129	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Bario Central	887	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Lallang Bario Baram	127	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Peluan Bario Baram	69	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Long Seridan Bario Baram	112.32	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Pa' Dalih Bario Baram	108	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Pa' Lungan Bario Baram	69.12	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Pa' Made Bario Baram	48.86	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Pa' Remudu Barion Baram	40.32	Grid-Connected	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Sungai Tunoh	288.12	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>
Malaysia	Nanoa Janan	164.64	Off-Grid	<a href="#">View Data</a>	<a href="#">View Data</a>	<a href="#">View Data</a>

<b>Economy</b>	<b>Number</b>
Indonesia	5
Malaysia	23
Thailand	8
United States	4
Viet Nam	<u>5</u>
	<b>45</b>
<b>Type</b>	
Grid-Connected	23
Off-Grid	<u>22</u>
	<b>45</b>
<b>Size kWp</b>	
1-100	31
100-200	7
200-1,000	<u>7</u>
	<b>45</b>



The screenshot displays a web browser window with the URL `apecpv.cmru.ac.th/basicdetails.php?id=25`. The page features a dark blue sidebar on the left with a user profile (Welcome, Worajit) and a menu with options: Home, PV Data Display, Data management, Edit Profile, Manual, and Logout. The main content area is titled 'General PV System Data' and shows details for the 'UITM-GERC Mono System'. The data is organized into sections: General, System, and Geographical.

Section	Field	Value
General	PV System Name	UITM-GERC Mono System
	Economy/Country	Malaysia
	City	SHAH ALAM
	Date Commissioned	2012-04-17
	Grid-Connected/Off-Grid	Grid-Connected
Funding Source	Private	
System	Module Type	Monocrystalline
	Installed PV Capacity	9 kWp
	Nominal Inverter Capacity	8 kWp
	Peak Sun Hour	4.7 h
	Battery Type	-
	Battery Capacity	-
	System Voltage (DC)	-
	Inverter Nominal Rating (AC)	-
	Auxiliary Generator Type	-
Auxiliary Generator Capacity	-	
Geographical	GPS	3.068734, 101.496945

← → ↻ 🏠 [apecpv.cmru.ac.th/middledetails.php?id\\_key=mJMT8ghbng](http://apecpv.cmru.ac.th/middledetails.php?id_key=mJMT8ghbng) 🔍 ☆ ⋮

Welcome,  
Worajit

☰

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## Monthly PV Data: PV System Operation Data

Go!

adiCET 702 kW
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-The Monthly PV Data comprised of Electrical Data (Power, Voltage, Current) and Ambient Condition Data (Irradiance, Ambient Temp, Module Temp, Wind Velocity, Rainfall)  
-The data are updated monthly.

Copy CSV Print
Search:

Upload Date	Total Power (kW.)	Average Voltage (V)	Average Current (A.)	Average Irradiance (W/m <sup>2</sup> )	Average Ambient Temp (°C)	Average Module Temp (°C)	Average Wind Velocity (mm)	Total Rainfall (m/s)
2017-02	333.64	658.59	511.9	604.54	34.1	47.12	0	0
2017-03	319.7	648.35	497.03	639.41	34.21	43.54	0	0
2017-04	189.15	662.86	294.52	693.15	32.94	44.67	0	0
2017-05	142.12	645.97	222.2	639.73	32.05	42.15	0	0

Showing 1 to 4 of 4 entries
Previous 1 Next

GENERAL

- 🏠 Home
- 🖥️ PV Data Display
- 📄 Data management
- 👤 Edit Profile
- 🚪 Logout
- 📖 Manual

← → ↻ 🏠 [apecpv.cmru.ac.th/advanceddetails.php?id\\_key=5Ylvw2IVuN](http://apecpv.cmru.ac.th/advanceddetails.php?id_key=5Ylvw2IVuN) ☆ ⋮

Welcome,  
Worajit

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### Daily PV Data: Detailed PV System Performance

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The Daily PV Data comprised of system performance data collected from the data logger such as: Electrical Data (Voltage, Current, Power) and Ambient Condition Data (Irradiance, Module Temp, Ambient Temp)

Show  entries
Search:

Date Upload	Performance (V, A, kW)	Irradiance ( W/m <sup>2</sup> )	Ambient Temp ( °C )	Module Temp ( °C )
2016-06-01	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-02	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-03	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-04	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-05	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-06	Download / View Chart	Download / View Chart	Download / View Chart	No Data
2016-06-07	Download / View Chart	Download / View Chart	Download / View Chart	No Data

Showing 1 to 7 of 7 entries
Previous 1 Next

- GENERAL
- Home
- PV Data Display
- Data management
- Edit Profile
- Logout
- Manual

Welcome, Worajit

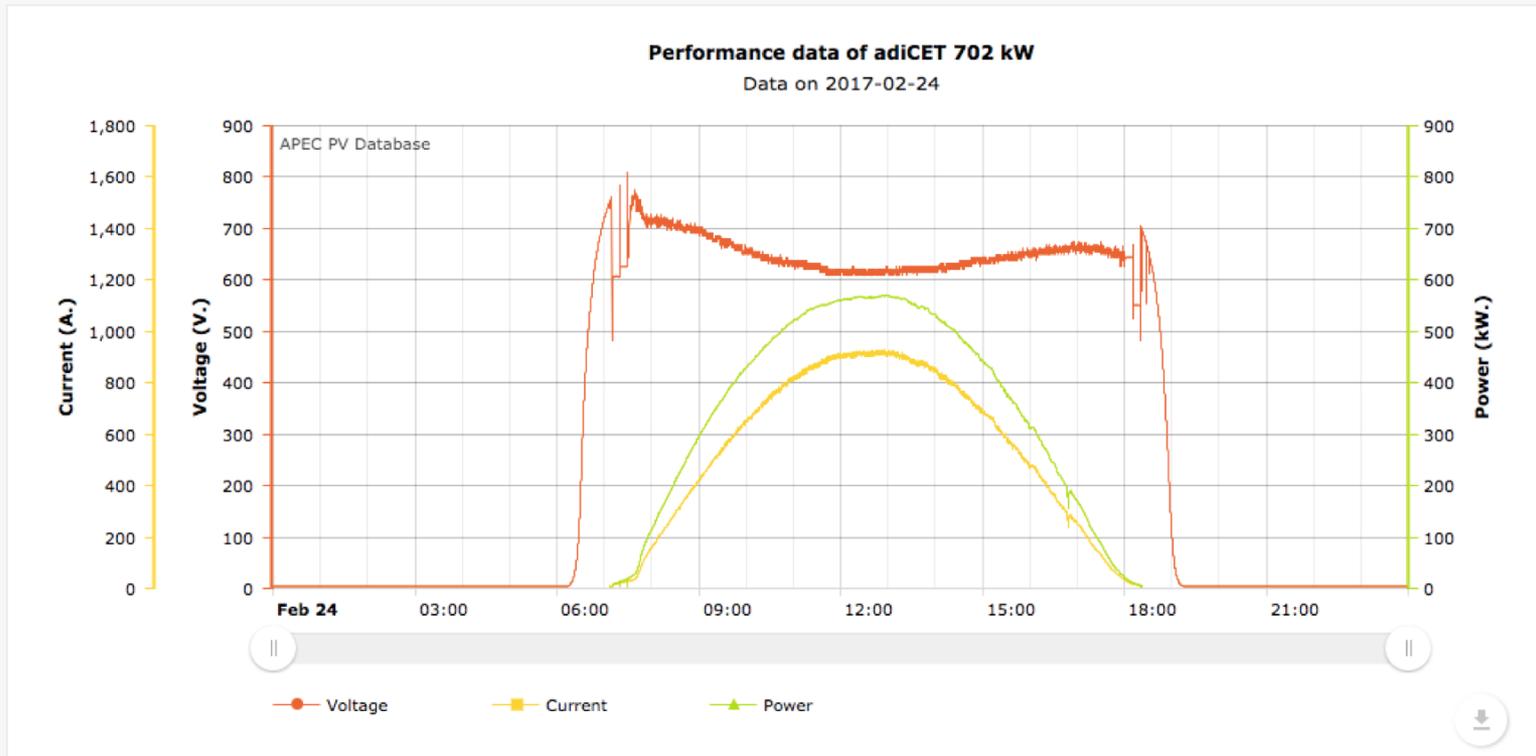
GENERAL

- Home
- PV Data Display
- Data management
- Edit Profile
- Logout
- Manual



adiCET 702 kW 2017-02-24

Search for...  Go!



← → ↻ 🏠 ⓘ apecpv.cmru.ac.th/realtime.php

Welcome, Worajit

**GENERAL**

- Home
- PV Data Display
- PV Database
- Display Realtime
- Data management
- Edit Profile
- Manual
- Logout

## Realtime Monitoring

**adiCET 702 kW**

**Economy/Country:** Thailand

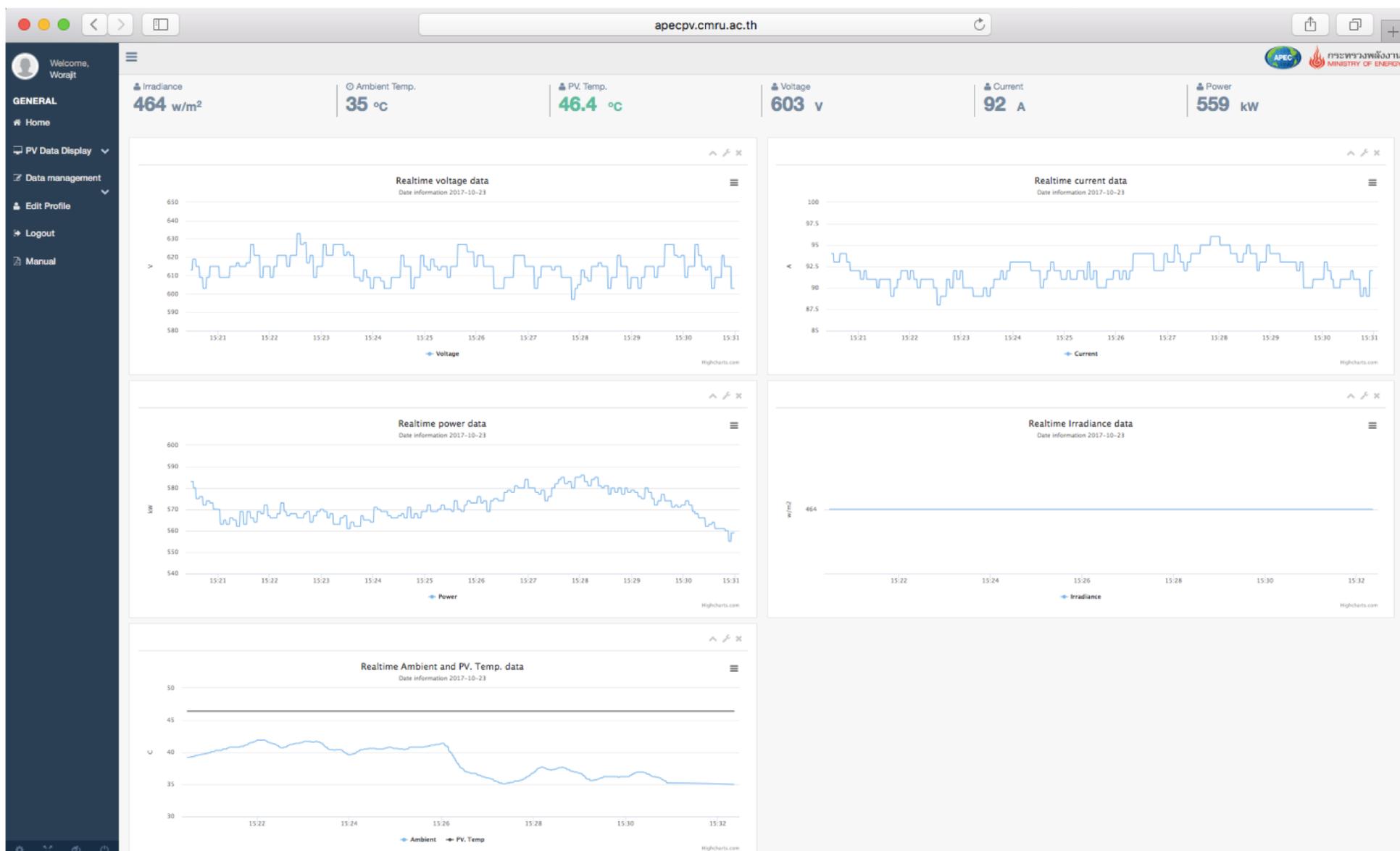
**City:** Chiang Mai

**Grid-Connected**

[Realtime monitor](#)

[More information](#)

[Monthly PV Data](#) [Daily PV Data](#)



- Tier 1: General data – all sites provided data
  - Technology of PV, PV Size, Inverter Capacity, Location, Date of Commissioned
  - Some provide source of funding, some peak sun hour, most do not have battery and generator
- Tier 2: Monthly Data
  - Difficult for data input due to manual input – should make automatic average/sum from the Tier 3 data
- Tier 3: Detailed Performance Data
  - Data was provided from grid-connected sites with real time monitoring
  - Off grid do not have data for this tier
- Data were provided from academic/research institutions & affiliations
  - University of Teknologi Mara, Malaysia
  - University of Indonesia, Indonesia
  - Chiang Mai Rajabhat University, Thailand
  - University of Phayao, Thailand
  - NECTEC, NSTDA, Thailand
  - NHEI, University of Hawaii, United States
  - Ho Chi Minh City University of Technology, Viet Nam
- Difficult to share data from private or government entity

- Data Updating → Progress & Barriers
  - Need good data; should have some quality control protocol to determine good quality data
  - Standardize units, range of data
  - Time format: date, time zone
  - Easier data input, data sorting, monthly input split to daily
  - Size of file limitation
- Data → Useful for Stakeholders
  - Focused on Performance data (more detail)
    - Performance ratio, Energy Storage, Power Factor, kWh
  - Location Site Mapping/ Geographical View
  - PV structure
  - CO<sub>2</sub> Emission Computations
  - Energy consumption data
  - Algorithm for Forecasting
- Way forward
  - Use IEC 61724 and build upon IEA PVPS Task Force
  - Datasharing agreement
  - Data sharing should start with Universities with their own monitoring system

- Using Existing Network – for data collection
  - Categorize 3 types of data:
    - General
    - National Monitoring System (Monthly/Yearly)
    - Detailed Monitoring System (1-15 min)
  - Grouping/Analyze data based on similar sites
  - Connect with other Related Association
    - Indonesia Green Building Association
    - Malaysia National Monitoring System
  
- Build upon the network with EGNRET Network, IEA database, APERC, CSR, Industry Associations, Government Monitoring
  
- Continuation of the project
  - Phase 1: Data Collection 5 Economies
  - Phase 2: Capacity Building – Discuss with APEC Sec with HNEI Support
  - Phase 3: Continue Data Collection for other Economies; Grouping; Analysis for 3 group of stakeholders → Data Utilization

- Ministry of Energy, Thailand
- APEC Secretariat
- Chiang Mai Rajabhat University
- University of Teknologi Mara
- University of Phayao
- Ho Chi Minh City University of Technology
- University of Indonesia
- National Chin-Yi University of Technology
- NECTEC, NSTDA
- NHEI, University of Hawaii
- Office of Naval Research, USA
- National Research Council of Thailand





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