



มหาวิทยาลัยราชภัฏนครปฐม

9673204

Drying and Storage

Course Description

Theory of drying, sun drying, principles of air flow, drying of agricultural products by heated air, moisture content determination, relationship of moisture and temperature, equilibrium moisture content, design of dryers, storage

Professional Interest Statement:

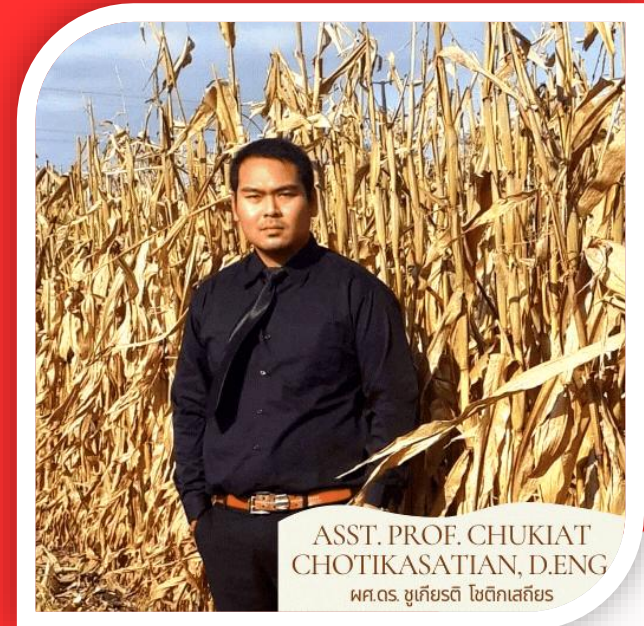
- Monitoring CO₂/O₂ concentrations to assess biological activity and reduce post-harvest losses
- Establishing verification criteria for unacceptable insect infestation levels
- Supporting fumigation and grain storage management decisions
- Developing agricultural product drying and intelligent drying systems

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Assistant Professor Dr. Chukiat Chotikasatian



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NPRU 2



Lecture 6.1 – Solar Calculator (Bonus!!!)

Study Questions – Lecture 6.1

- 1. Why does geographical location (Latitude and Longitude) affect the amount of solar energy received?*
- 2. How can modern tools like the Global Solar Atlas simplify the assessment of solar drying potential?*





Lecture 6.1 – Solar Calculator (Bonus!!!)

Outline – Lecture 6.1

- 1. Importance of Geographical Location on Solar Energy*
- 2. Introduction to Global Solar Atlas*
- 3. Key Parameters for Solar Drying*
- 4. Example: Evaluating Solar Drying Potential*



Importance of Geographical Location

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- Solar radiation reaching the Earth's surface varies significantly based on geographic coordinates (Latitude and Longitude)
- The angle of sunlight and the distance it travels through the atmosphere change depending on the location
- Traditionally, assessing available solar energy required complex astronomical and trigonometric calculations
- Modern Engineering Approach: We bypass manual calculations by utilizing satellite data and geographic information systems (GIS) to obtain highly accurate, location-specific data



Global Solar Atlas

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GLOBAL SOLAR ATLAS
GLOBAL WIND ATLAS | ENERGYDATA.INFO

Search locations

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Site
Area
Region
Distance

Welcome to the Global Solar Atlas.
Start exploring solar potential by clicking on the map.
Select sites, draw rectangles or polygons by clicking the respective map controls.
Calculate energy production for selected sites.

RELEASE NOTES HELP

The Global Solar Atlas is a free, web-based tool provided by the World Bank Group

THE WORLD BANK ESMAP SOLARGIS

Leaflet | PVOUT map © 2026 Solargis, © OpenStreetMap



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Reference: [Global Solar Atlas](#)

Key Parameters for Solar Drying

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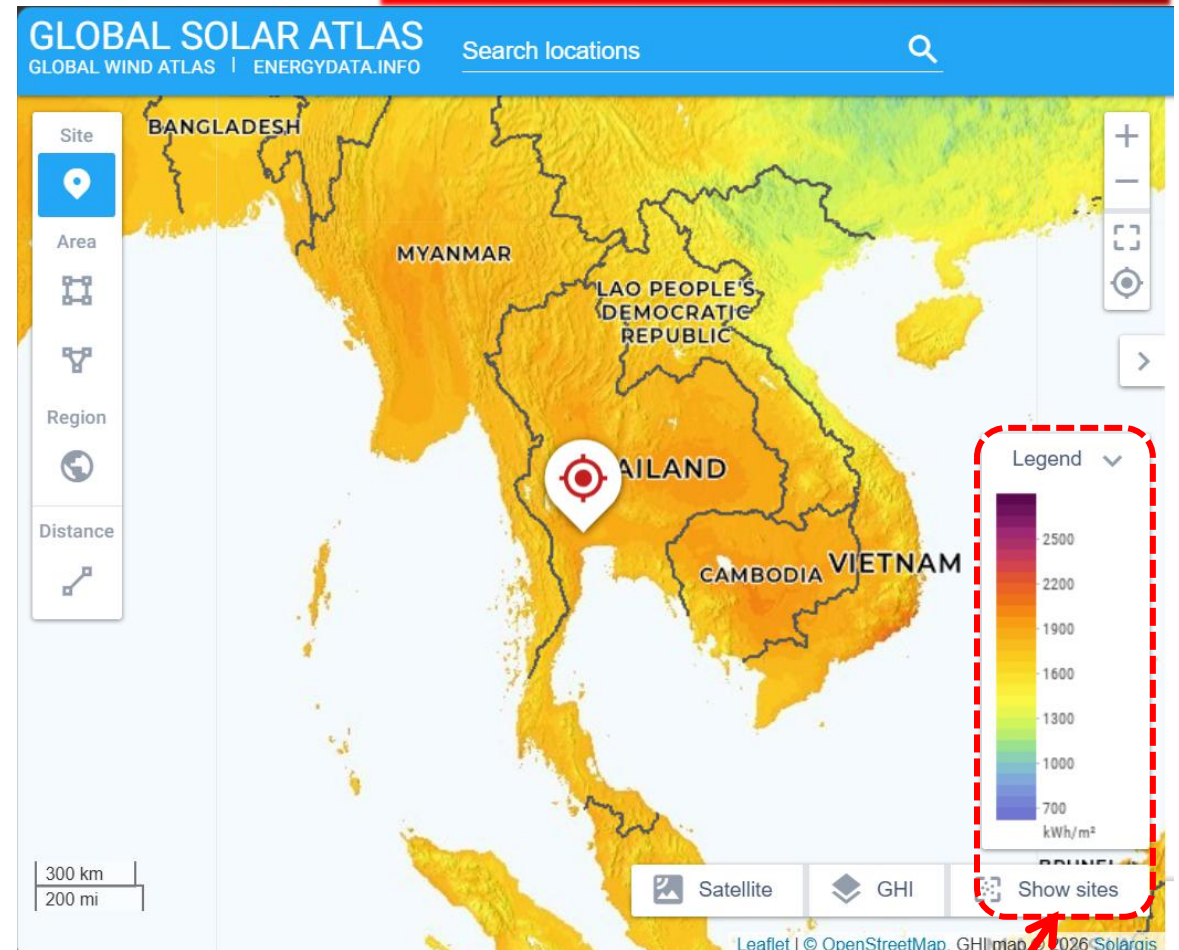
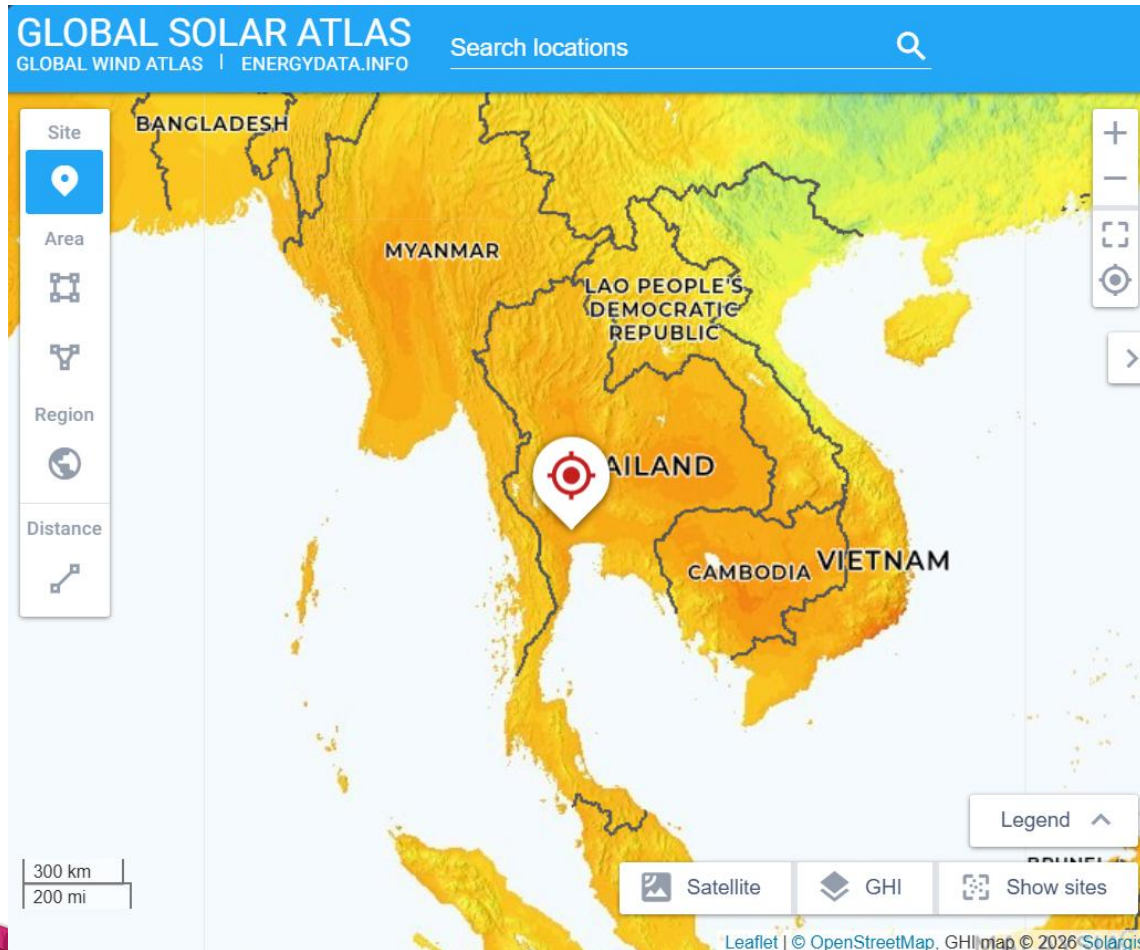


- When using the Solar Calculator, agricultural engineers focus on specific meteorological data:
 - ✓ **GHI (Global Horizontal Irradiation):** The total solar energy falling on a horizontal surface
 - This is the primary energy source for flat-bed drying and greenhouse dryers
 - ✓ **TEMP (Air Temperature):** The average ambient temperature
 - Warmer air has a higher moisture-holding capacity, which accelerates the drying process



Practical Application

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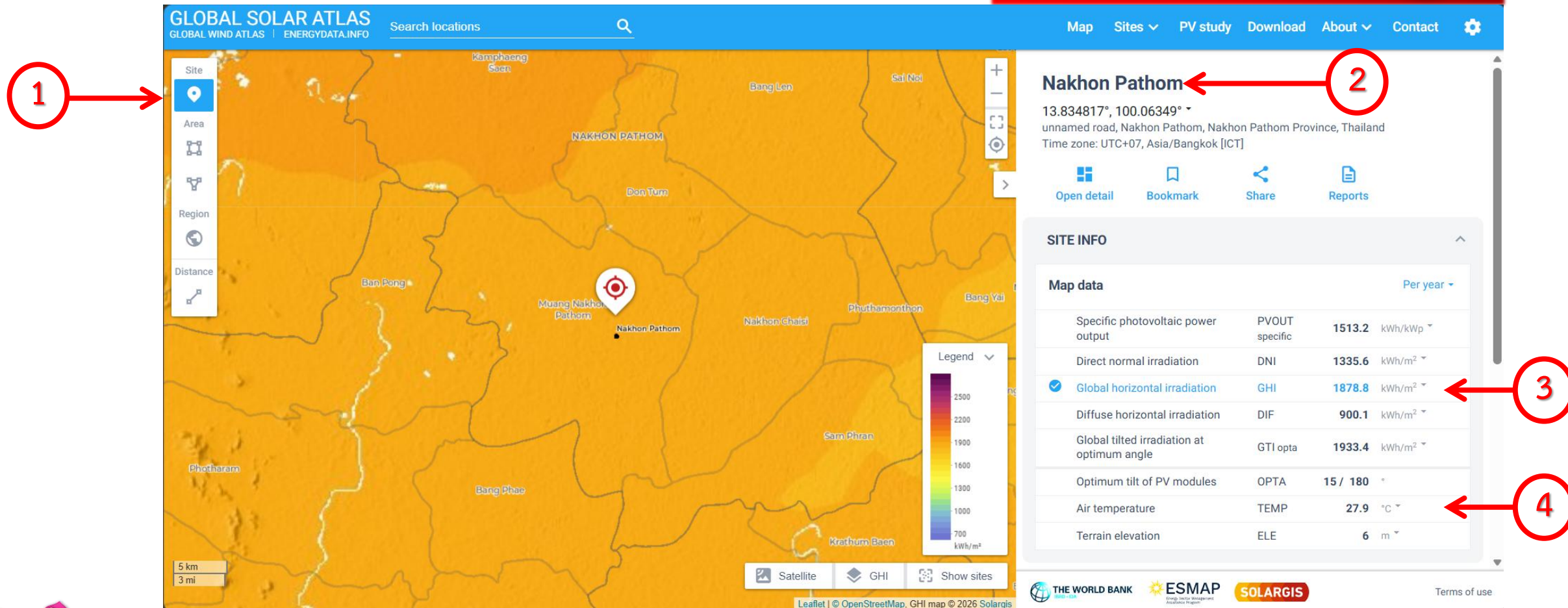
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Reference: [Global Solar Atlas](#)

Practical Application (Cont.)

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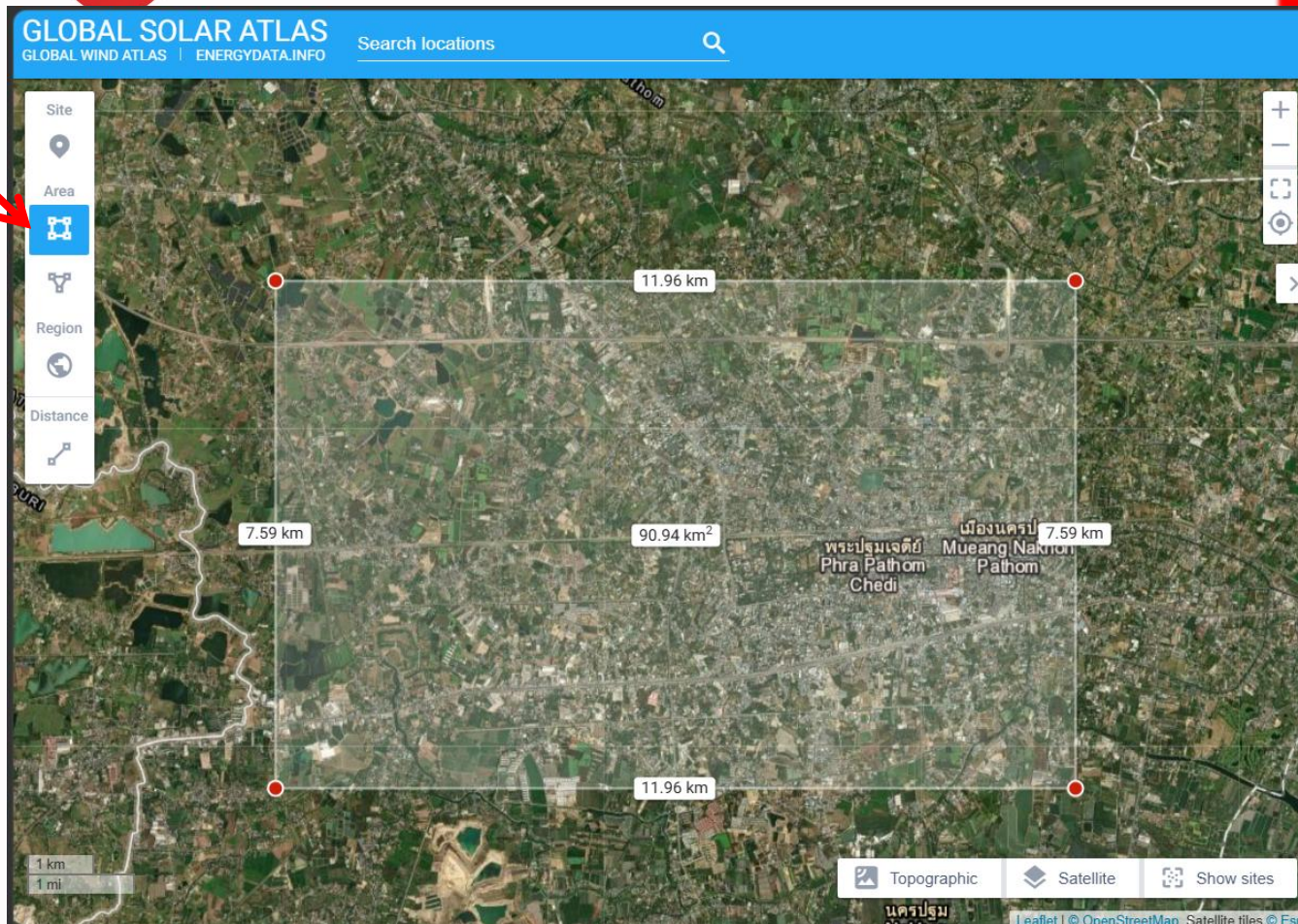
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Reference: [Global Solar Atlas](#)

Practical Application (Cont.)

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Surface area should be larger than 100.00 km²

Delete and start drawing a new one

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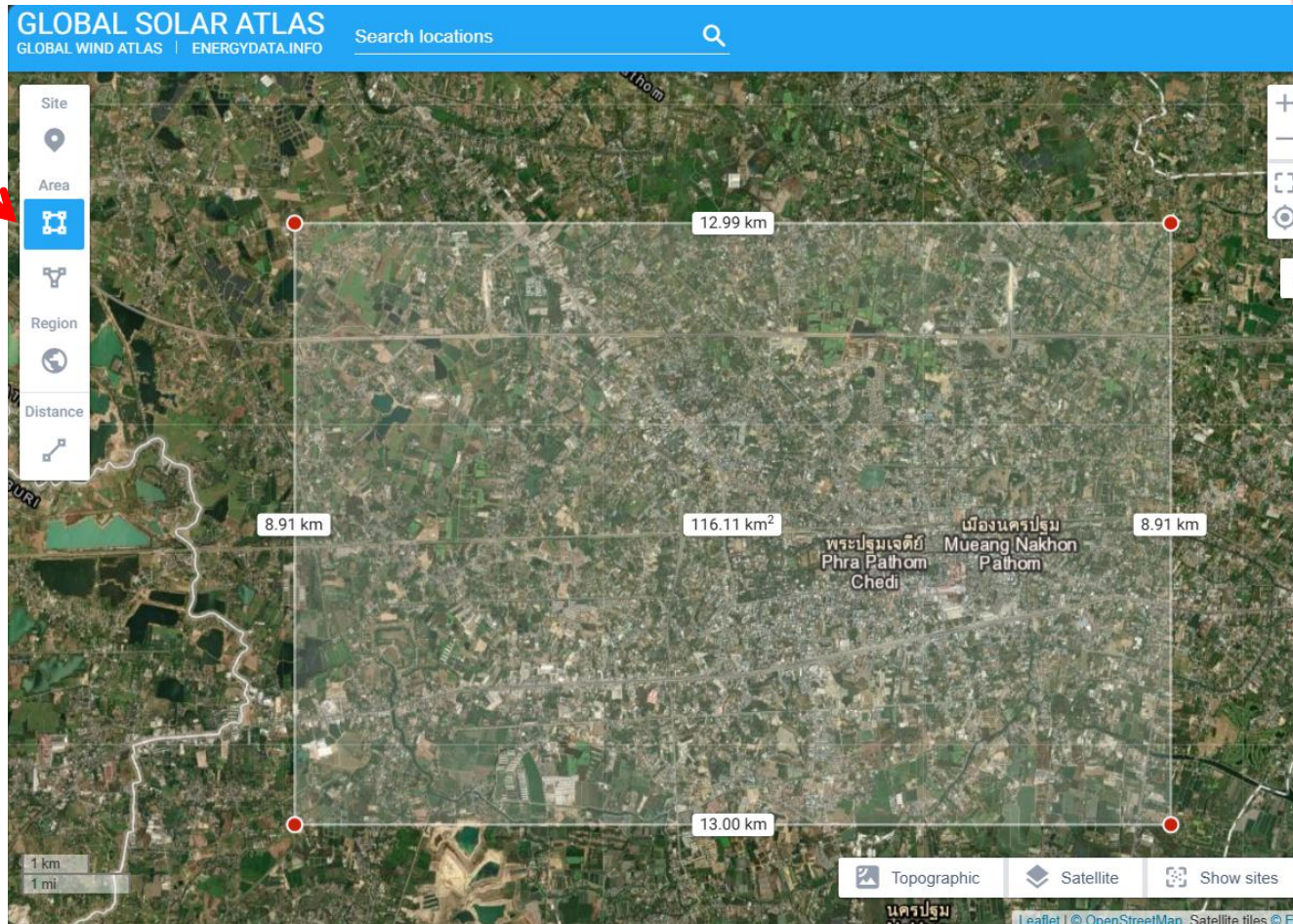
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Reference: [Global Solar Atlas](https://globalsolaratlas.info/)



Practical Application (Cont.)

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You just created an area with size : 116.11 km²

Calculate area statistics

Delete and start drawing a new one

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Reference: [Global Solar Atlas](#)



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Area: 116.11 km²
Perimeter: 43.82 km

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AREA INFO

Map data (min-max range)Per day

Specific photovoltaic power output	PVOUT	4.13 — 4.15	kWh/kWp
Direct normal irradiation	DNI	3.63 — 3.68	kWh/m ²
Global horizontal irradiation	GHI	5.13 — 5.16	kWh/m ²
Diffuse horizontal irradiation	DIF	2.45 — 2.47	kWh/m ²
Global tilted irradiation	GTI	5.28 — 5.30	kWh/m ²
Optimum tilt of PV modules	OPTA	15 — 15	°
Air temperature	TEMP	27.9 — 27.9	°C
Terrain elevation	ELE	5 — 10	m

AREA ANALYSIS

THE WORLD BANK

ESMAP

SOLARGIS

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Practical Application (Cont.)

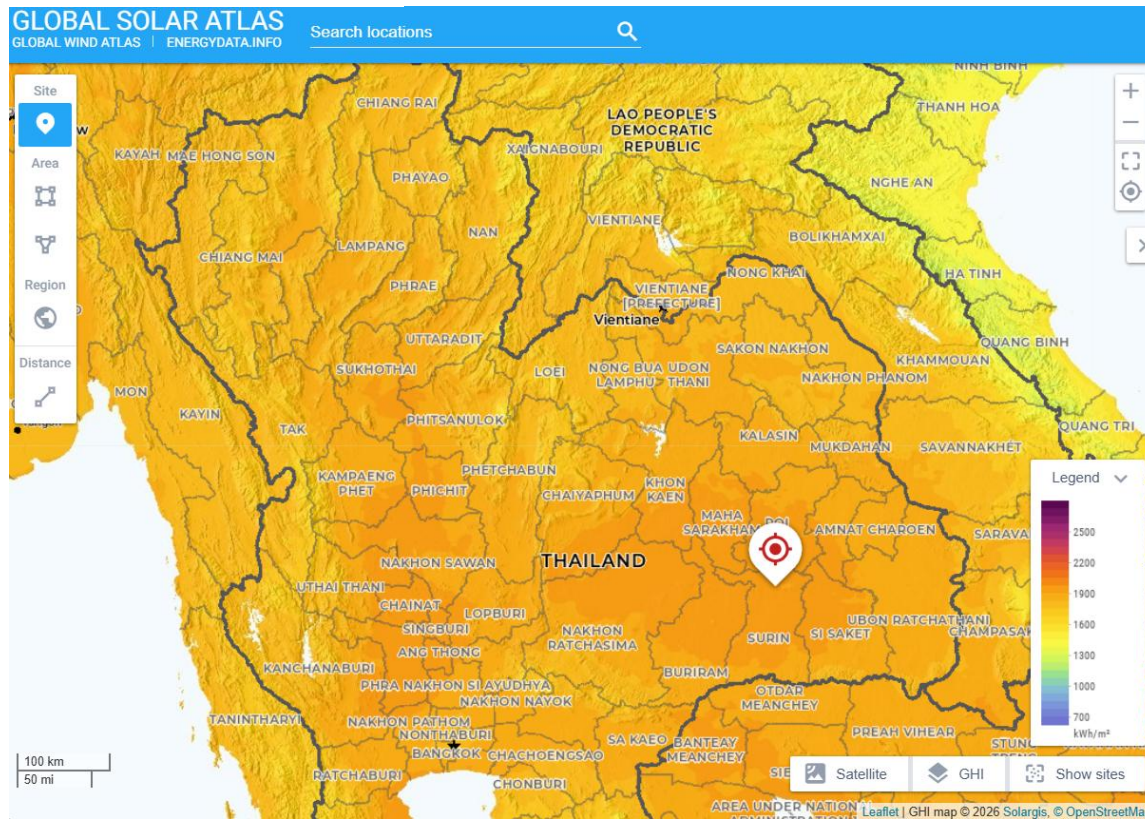


Practical Application (Cont.)

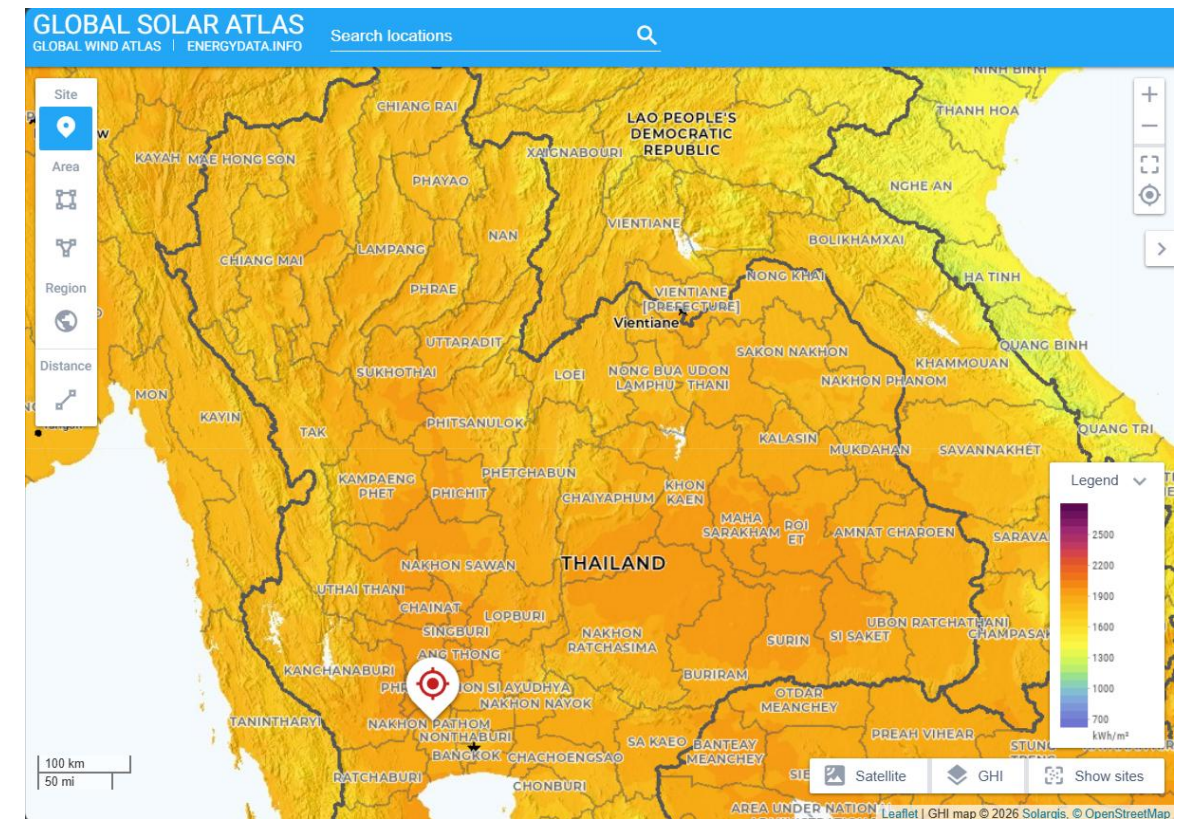
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Surin Province



Nakhon Pathom Province



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Reference: [Global Solar Atlas](#)

Practical Application (Cont.)

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Location Impact on Solar Drying

- Higher GHI (e.g., Surin):
 - Absorbs more solar heat energy
 - Yields a higher water evaporation capacity
- Higher Air Temp (e.g., Nakhon Pathom):
 - Warmer initial air holds more moisture
 - Requires less energy to reach the target drying temperature

Surin Province

15.284645°, 103.72728°
unnamed road, Surin Province, Thailand
Time zone: UTC+07, Asia/Bangkok [ICT]

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SITE INFO

Map data

Specific photovoltaic power output	PVOUT specific	1569.1	kWh/kWp
Direct normal irradiation	DNI	1429.6	kWh/m ²
☒ Global horizontal irradiation	GHI	1914.5	kWh/m ²
Diffuse horizontal irradiation	DIF	898.4	kWh/m ²
Global tilted irradiation at optimum angle	GTI opta	1993.8	kWh/m ²
Optimum tilt of PV modules	OPTA	18 / 180	°
☒ Air temperature	TEMP	26.6	°C
Terrain elevation	ELE	168	m

Nakhon Pathom Province

14.009362°, 100.11123°
unnamed road, Nakhon Pathom Province, Thailand
Time zone: UTC+07, Asia/Bangkok [ICT]

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SITE INFO

Map data

Specific photovoltaic power output	PVOUT specific	1522.9	kWh/kWp
Direct normal irradiation	DNI	1345.6	kWh/m ²
☒ Global horizontal irradiation	GHI	1890.1	kWh/m ²
Diffuse horizontal irradiation	DIF	901.5	kWh/m ²
Global tilted irradiation at optimum angle	GTI opta	1946.5	kWh/m ²
Optimum tilt of PV modules	OPTA	16 / 180	°
☒ Air temperature	TEMP	28.0	°C
Terrain elevation	ELE	3	m



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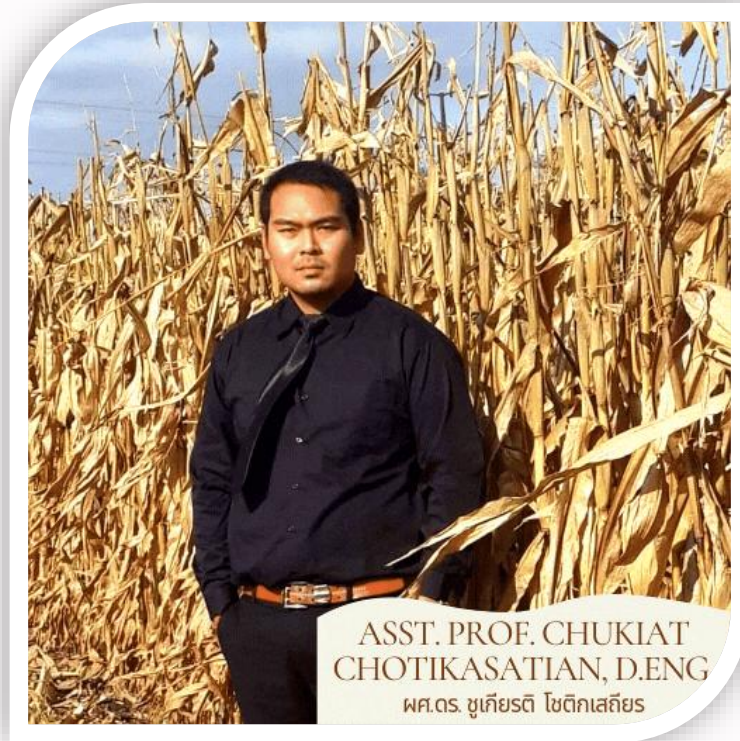
Summary

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1. Geographic location (Latitude and Longitude) fundamentally dictates the available solar energy for agricultural drying
2. Utilizing the Global Solar Atlas eliminates the need for complex manual solar geometry calculations, allowing engineers to focus on system design
3. The GHI parameter is directly converted into useful thermal energy to estimate the daily water evaporation capacity of a solar drying system





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Thank you very much for your kind attention.

Questions?

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Study Questions – Lecture 6.1

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