



Solar Heat for Industrial Processes in Malaysia

From awareness to implementation

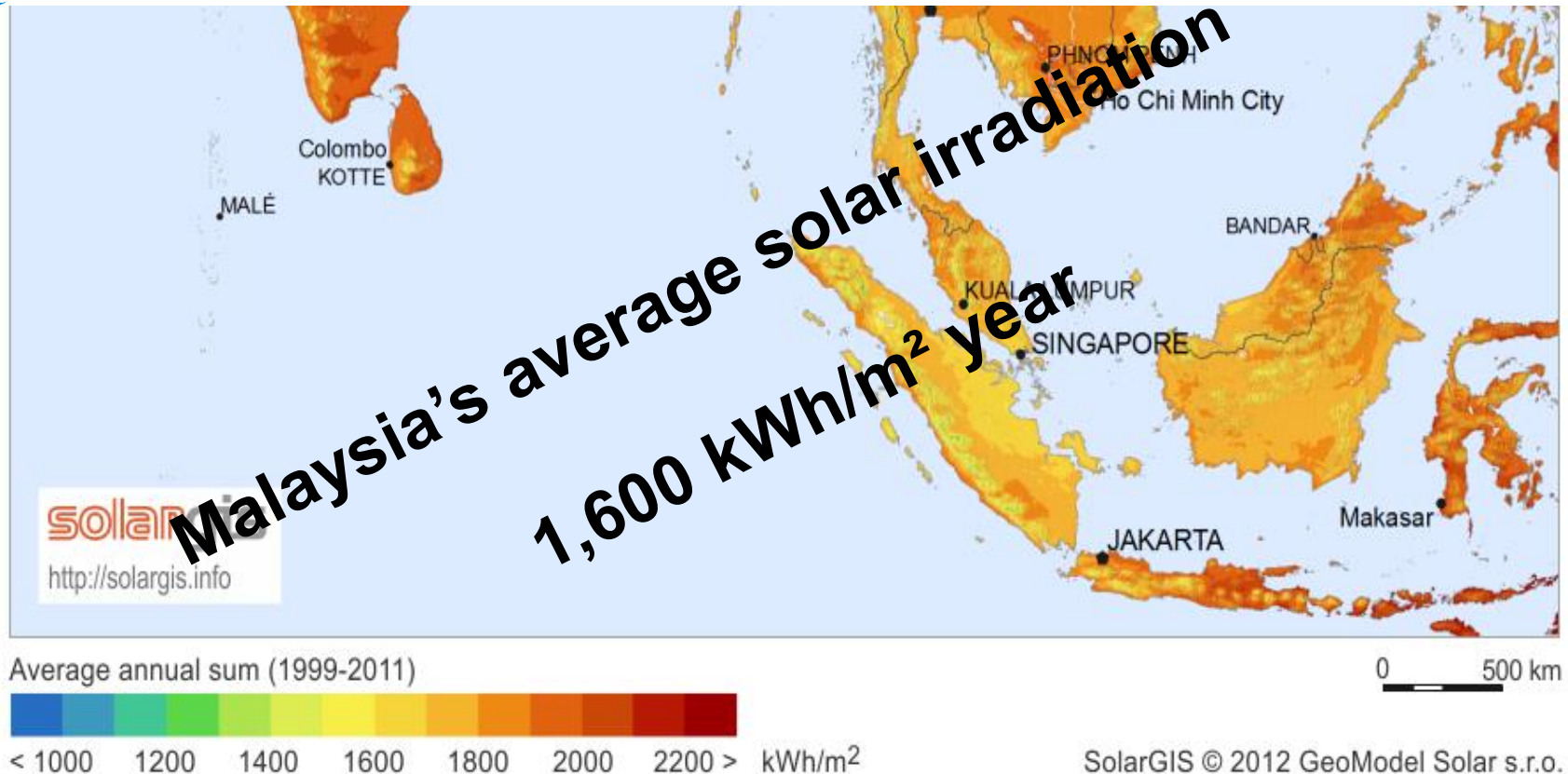
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Solar Heat for Industrial processes (SHIP) has a huge potential in Malaysia

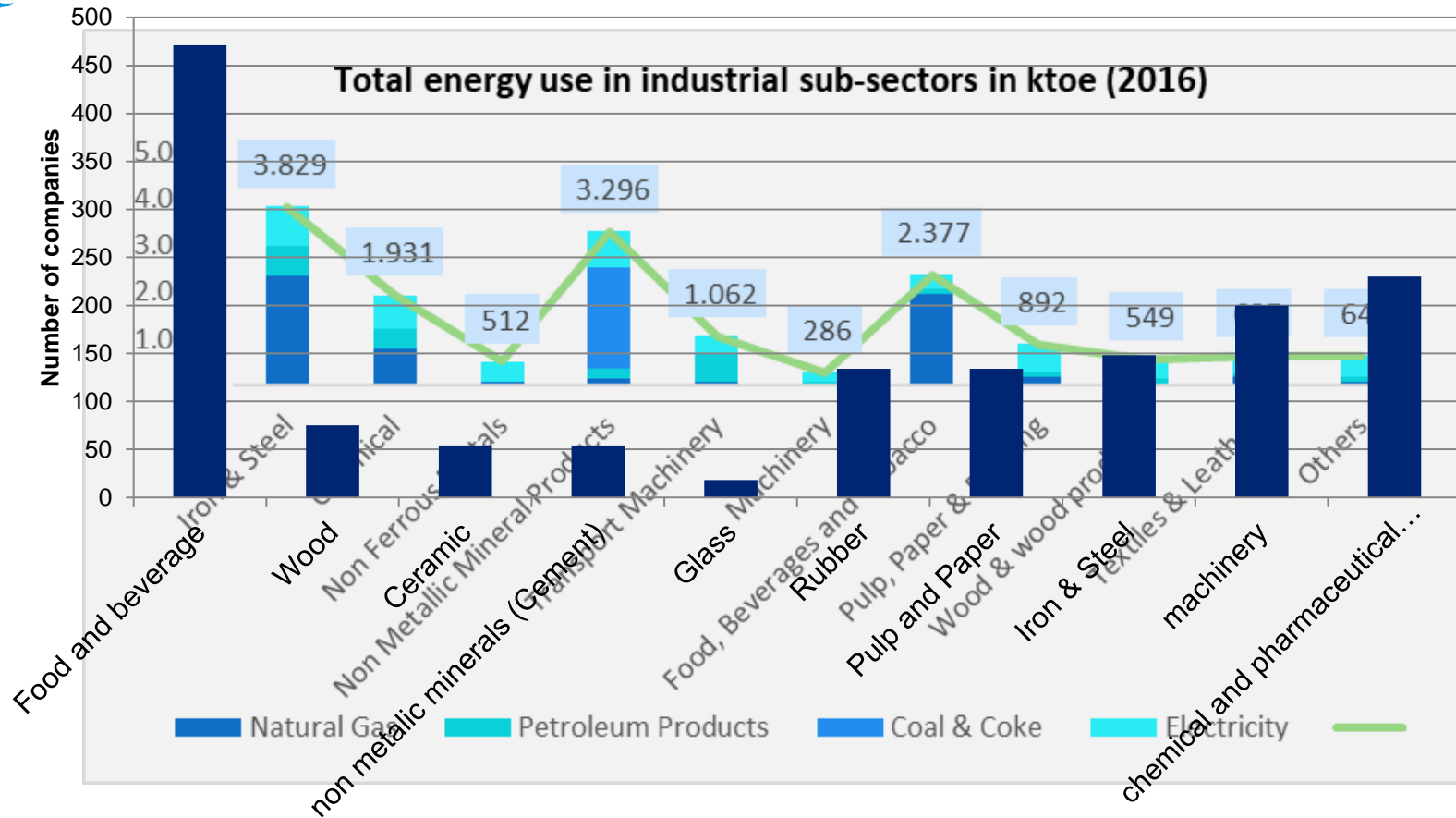
Solar Irradiation Malaysia

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Starting point

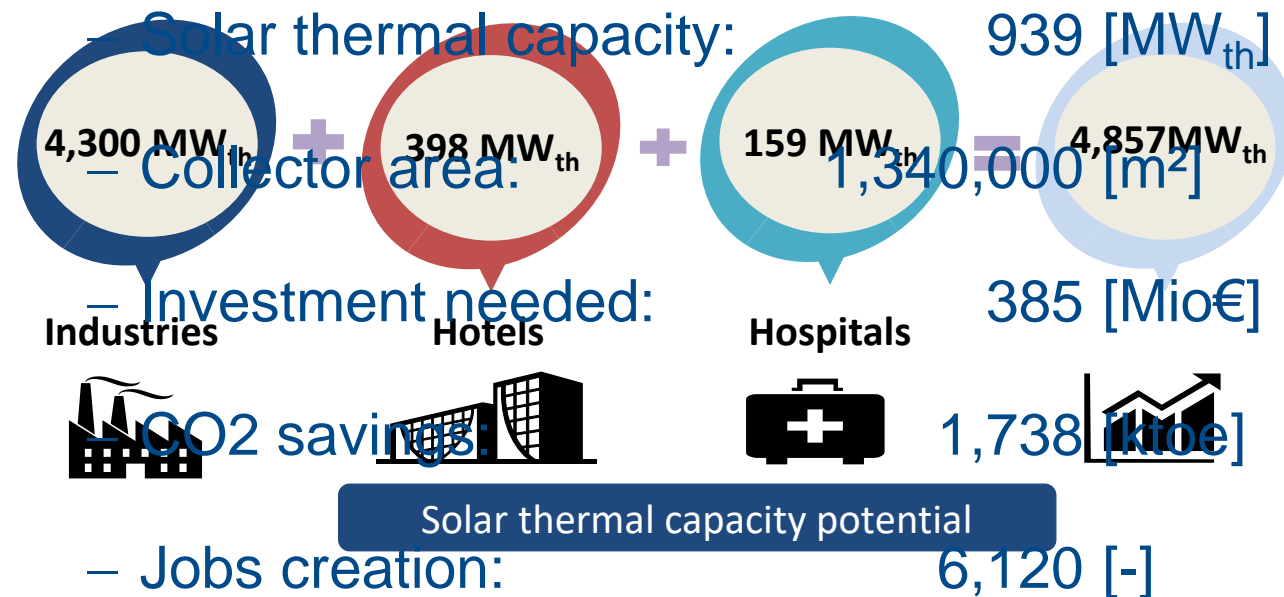
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Source: Solar Thermal Roadmap for Malaysian Industries, UNIDO

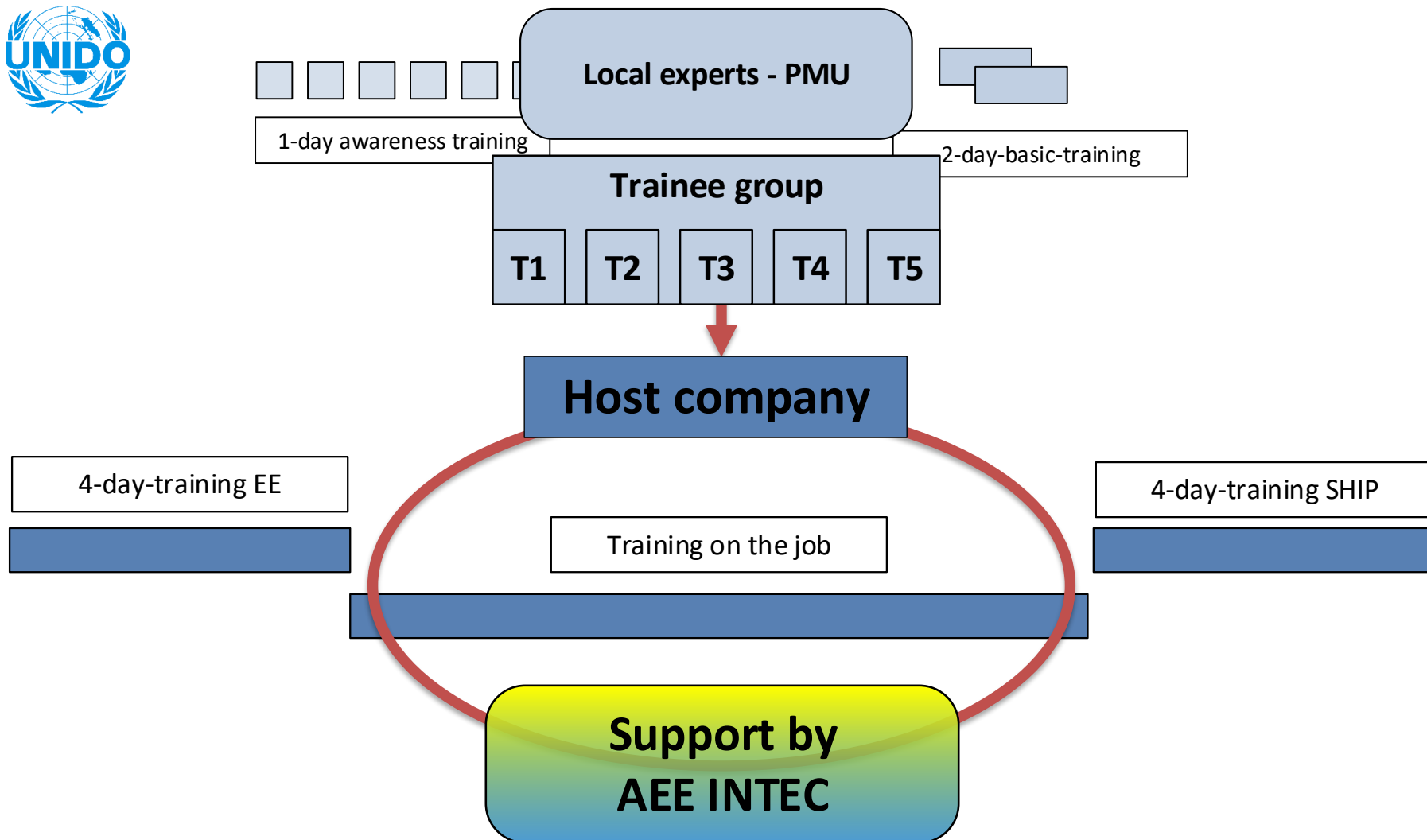
SHIP potential and targets

■ Roadmap target - 2025 (total)



But how without a solar community?

Training setup



Host Companies



Edgenta Mediserve Sdn Bhd (109818-H)



Appropriate tools for SHIP identification and quick design



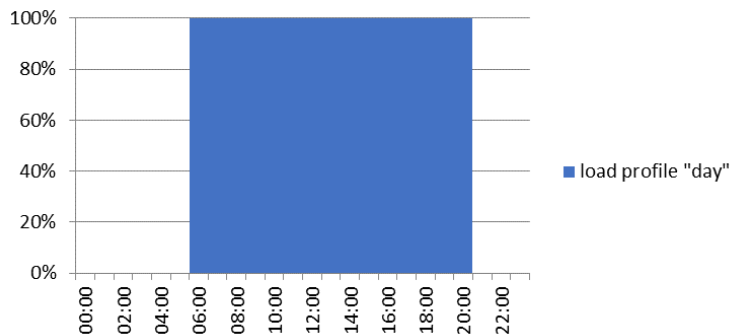
- Expertise SHIP linked to EE
- Accompanying tools used along training and in future SHIP community in Malaysia and Egypt
- Demand
 - quick design of SHIP
 - including process/supply demand, components, collector types, placement, orientation
 - as basis for
 - detailed system simulation so called pre-design
 - first assessment on technical and economic feasibility
 - convincing and support of industry in decision on further design towards implementation
 - double check of received concepts from external experts and offers from solar companies

Key sections of SHIP Tool

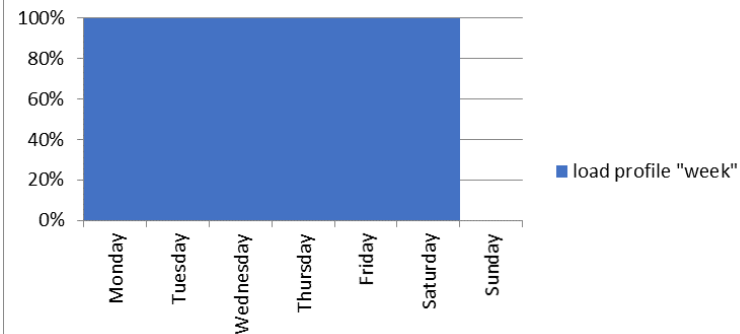
- (1) Process integration
 - Integration concept
 - Process heat exchanger
 - **Yearly process load profile**
- (2) Solar concept
 - **Collector definition**
 - **Climate definition**
 - Key component sizing (collector field, storage)
 - **Yearly analysis for system evaluation and KPIs**
- (3) Techno-economic comparison
 - Levelised cost of heat
 - **Comparison of up to 10 scenarios**

Process Load Profile

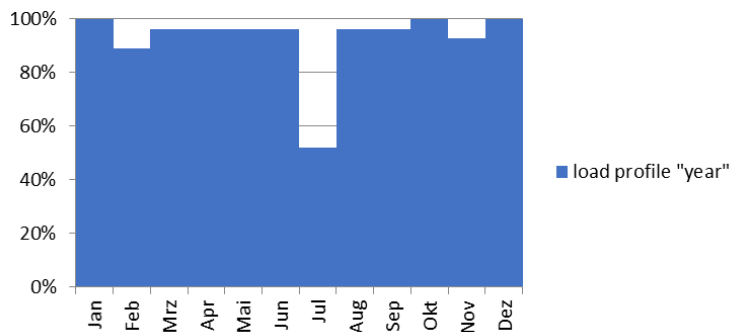
load profile "monday"



load profile "week"



load profile "year"



yearly profile
with
hourly values

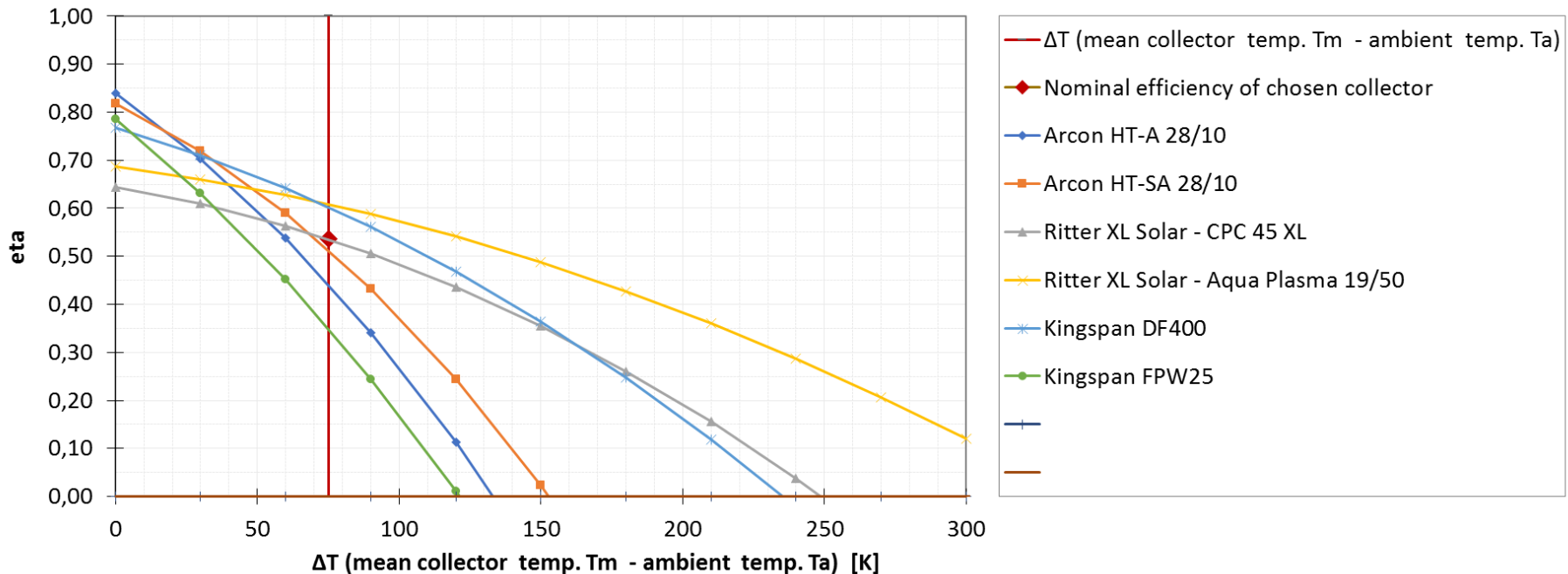
Collector selection, sizing and placement

Definition of solar thermal collectors	Collector efficiency coefficients			Length	Width	Aperture area	Gross area
	c0	c1	c2	L	W	A _{ap}	A _{gr}
	[-]	[W/(K·m ²)]	[W/(K ² ·m ²)]	[m]	[m]	[m ²]	[m ²]

[Find more collectors on Solar Keymark website](#)

Arcon HT-A 28/10	0,839	3,2	0,0137	2,27	5,96	12,54	13,57
Arcon HT-SA 28/10	0,817	2,205	0,0135	2,27	5,96	12,52	13,57

Collector efficiency curves



Climate framework

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http://re.jrc.ec.europa.eu/pvg_tools/en/tools.html#HR

d) Import CSV-File to this file

Deviation from UTC

8

Import

Optional: Delete climate data set

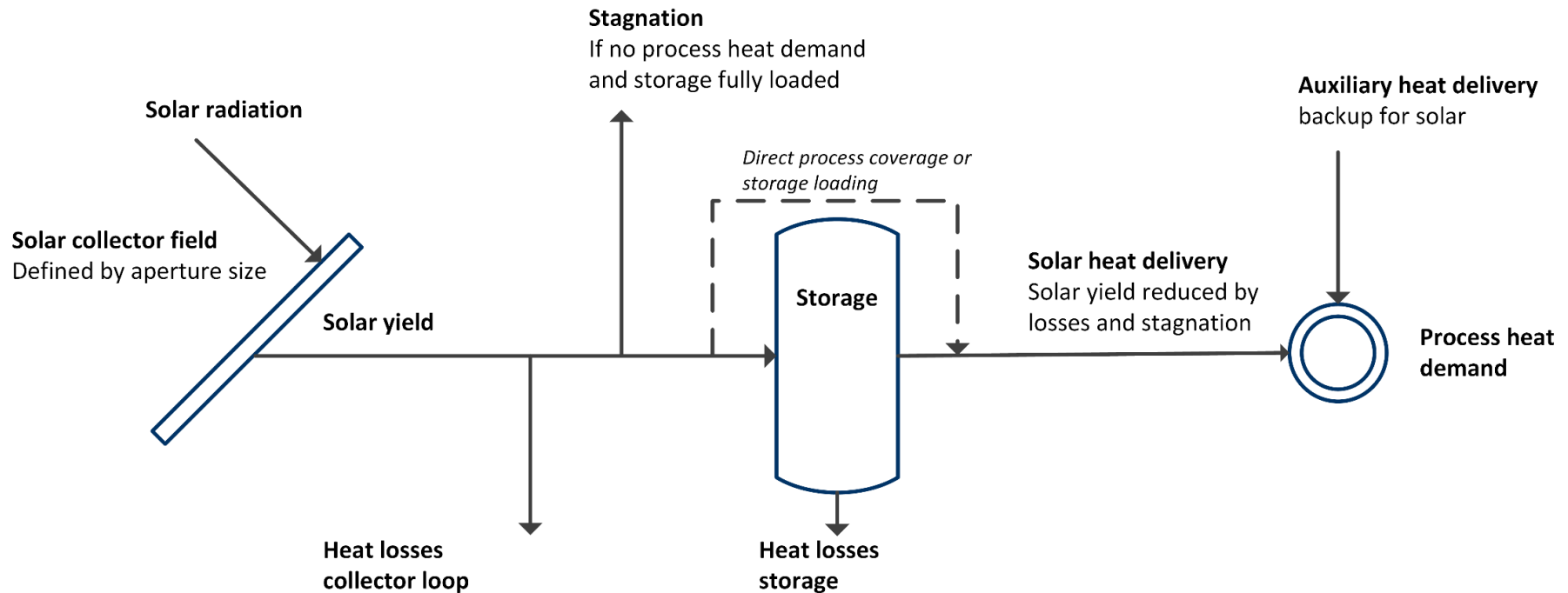
- > Note that the SHIP tool can contain maximal 10 climate data sets
- > If you need space, please delete existing climate data sets
- > Choose the climate data set and click the delete button

Kuala Lumpur (South)

Delete

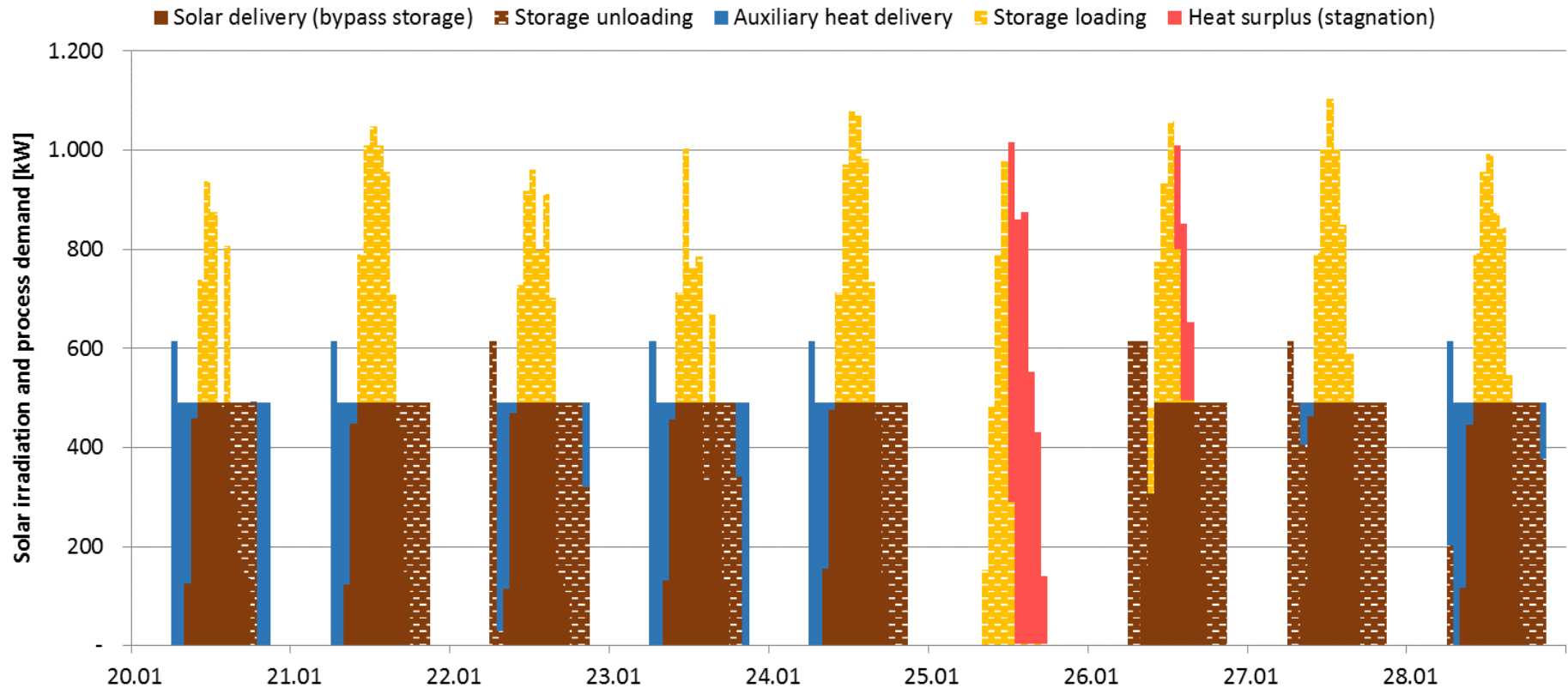
The screenshot displays the PVGIS-SARAH web application interface. On the left, a map of Kuala Lumpur, Malaysia, is shown with a location pin. A pink box labeled 'Define location' points to the map. Below the map, the address 'kuala lumpur' and coordinates 'Lat/Lon: Eg. 45.815; Eg. 8.611' are visible. On the right, the 'HOURLY RADIATION DATA' settings panel is shown. A pink box labeled 'Hourly Data!!!' points to the 'HOURLY DATA' option in the left sidebar. Another pink box labeled 'Define slope and azimuth' points to the 'Slope' and 'Azimuth' input fields. A third pink box labeled 'Ensure other settings are as shown here!' points to the 'PV power' and 'Radiation components' sections. The 'HOURLY DATA' section includes options for 'Mounting type' (Fixed, Vertical axis, Inclined axis, Two-axis), 'Slope' (10), 'Azimuth' (0), 'PV power' (PV technology, Installed peak PV power [kWp], System loss [%]), and 'Radiation components'. The 'Use terrain shadows' section has checkboxes for 'Calculated horizon' and 'Upload horizon file'. The 'Download csv' button is at the bottom right.

Yearly analysis and KPIs



Solar yield [kWh/a]	1.948.929
Spec. solar yield [kWh/m ² .a]	743
Solar heat delivery [kWh/a]	1.697.508
Spec. solar heat delivery [kWh/m ² .a]	737
Solar fraction	61,5%
Utilization rate (weighted yearly collector efficiency)	49,2%
Heat losses storage [kWh/a]	14.963
Stagnation losses	3,5%

Yearly analysis as basis for scenario analysis



Implementations in Malaysia

- Energy efficiency → 95 single measures
- SHIP investment procedure
 - Up to 30% of investment costs funded
 - Applying SHIP tool → standard project development
 - presented to industry and investors
 - Concept presented to industry
 - Call for tender and received offers
 - Confirmation by Task Force
 - Investment by industry, „re-financing“ after commissioning and paid invoice

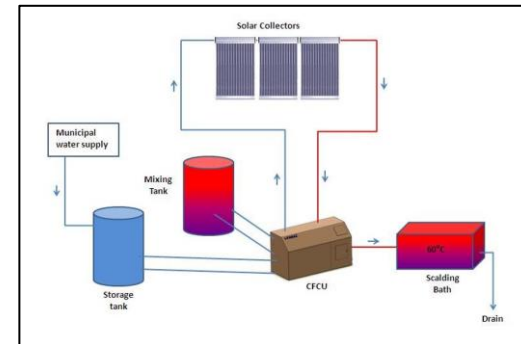
Implementation SHIP and project pipeline



- Project focus: industry, hospitals, hotels
- Implementations
 - 3 finished
 - 4 pending
- Beside implementations achieved / envisaged
 - Tender phase: 7 projects
 - Decision phase: 14 projects
 - Concept phase: 26 projects
 - Technical support: 5 projects
- Monitoring phase in 2 companies ongoing



- The existing hot water system is supplied by an electric boiler. The solar thermal system covers 80% of the thermal process demand, producing hot water at a temperature of 91°C.
 - Collector Area: 119 m²
 - Storage volume: 8 m³
 - Annual savings: RM 71,700
 - ROI: 3.2 years
 - CO₂ savings: 266 t/a



1st Runner Off-grid:
Thermal Category

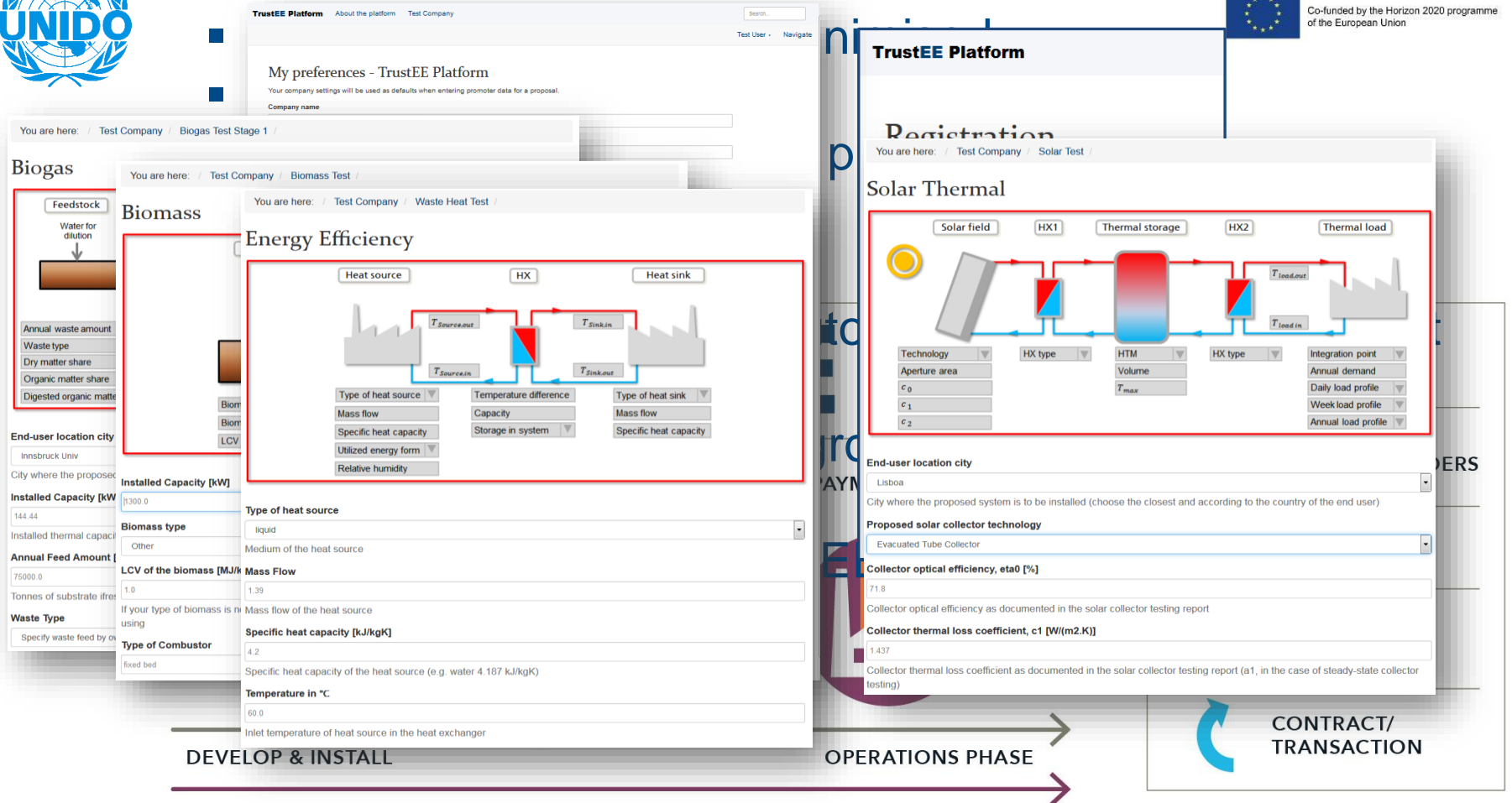


Financing via TrustEE

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PROJECT LIFECYCLE



- Malaysia
 - Overcome COVID-19 phase
 - Roadmap deployment as part of upcoming green legislation act
 - Expert certification requested by government in order to follow standardised procedures
 - Frontrunners push industry
 - TrustEE implemented in Malaysian financing scheme

Solar heat for industrial processes

SHIP has a huge potential
not only in Malaysia

...but worldwide!



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IDEA TO ACTION

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