

Latest Heatlle Panel Catalog
HAETLE PANEL Catalog 2023



NPO ESCOT

Energy Saving Conference & Organic Technology

NPO ESCOT Kashiwa Environmental Research Institute

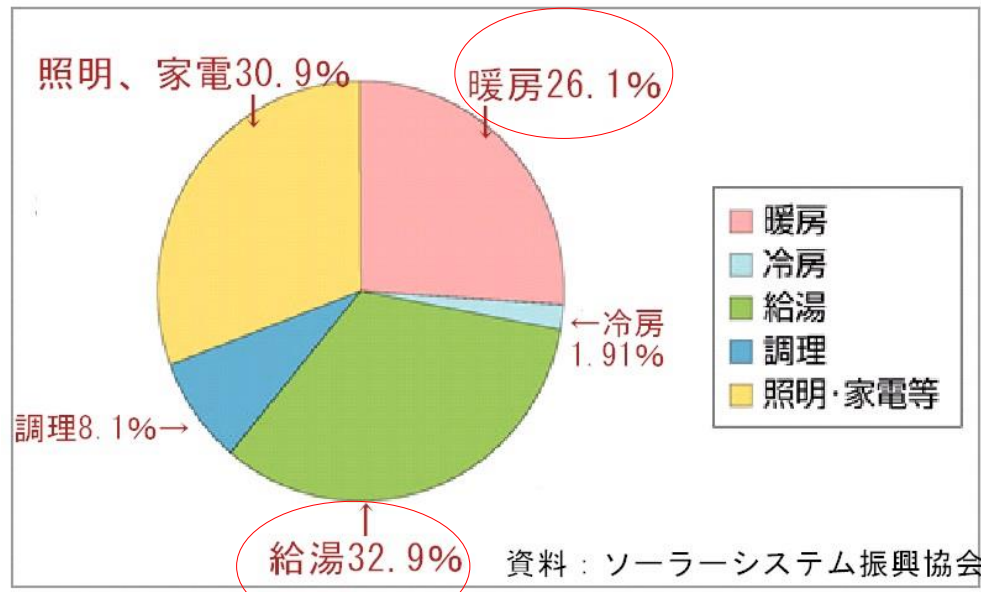
4-17 Azumakami-cho, Kashiwa-shi, Chiba 277-0011

<https://npo-escot.org>

mail:ser.kashiwa@gmail.com tel: +81-(0)80-4365-0861 fax:04-7166-4128

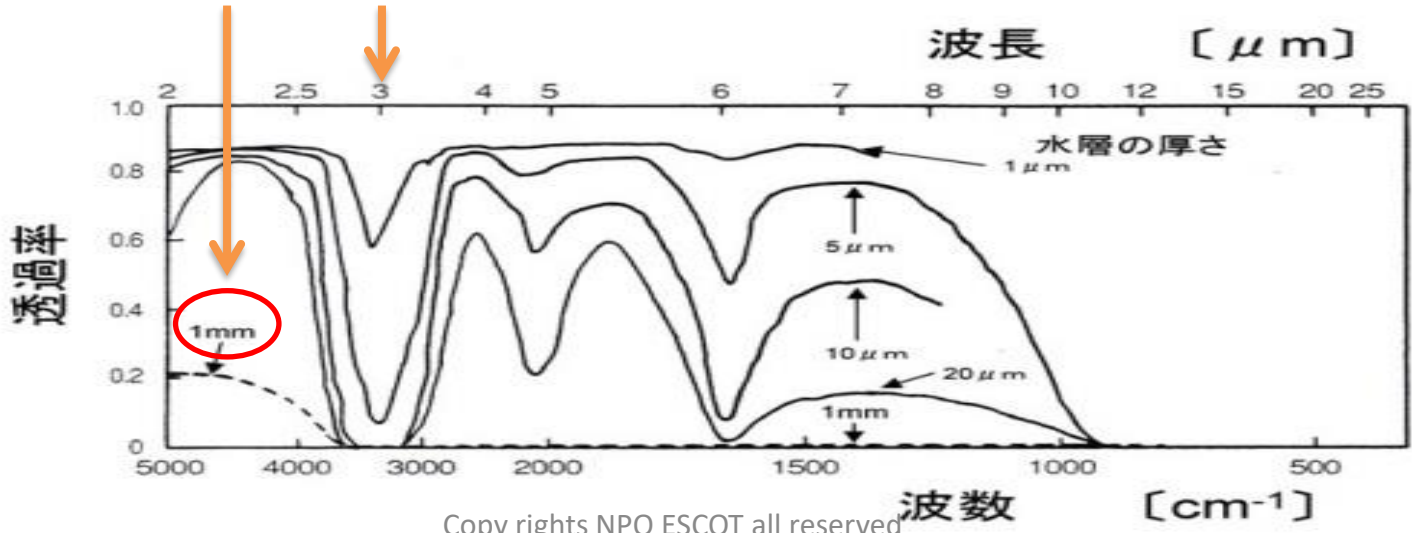
Energy demand and water heat absorption effect

Approximately 60% of household energy is low-temperature thermal energy.



The 1 mm water layer absorbs almost 100% of far-infrared radiation.

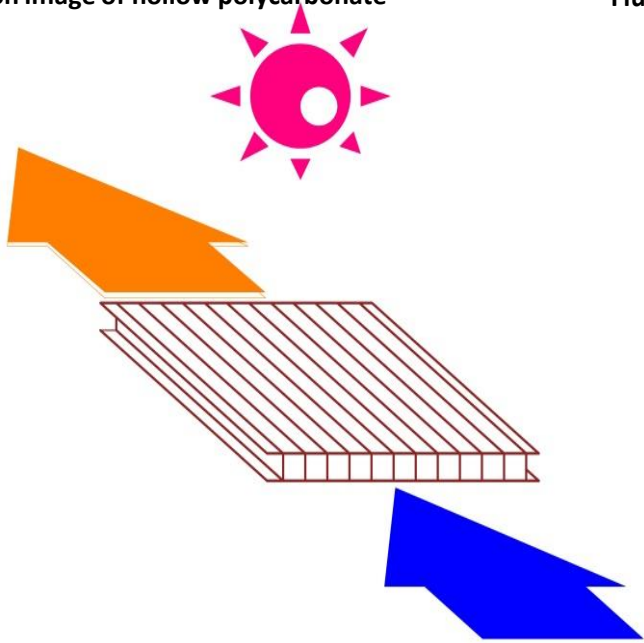
*Far infrared radiation, also called heat radiation, is an electromagnetic wave with wavelengths of approximately 4 - 1000 μm.



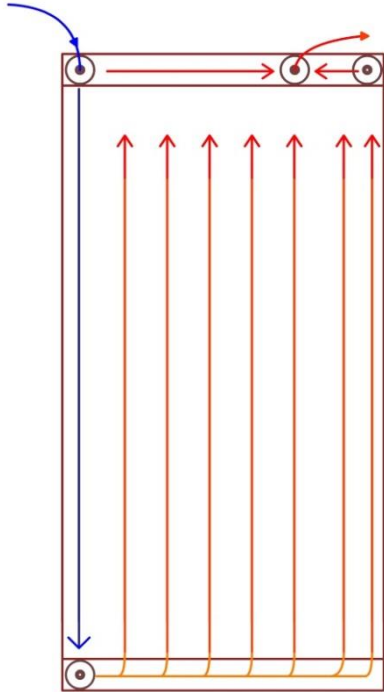
Heatlle Panel Features

- 1. what is the purpose of development?
We provide solar systems that users can **build, use, repair, and improve.**
- 2. why heat?
(1) **Approximately 60% of a household's energy is thermal energy below 42° C.**
The reason is that the **energy conversion efficiency is approximately 50%, which is higher than that of electricity.**
- 3. why hollow polycarbonate?
Superior in terms of heat resistance, durability, workability, and versatility.
- 4. what are the characteristics in dissemination?
We aim to promote this **business as an energy-creating business that revitalizes local communities.**

Heat collection image of hollow polycarbonate

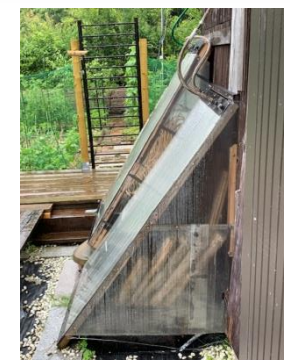
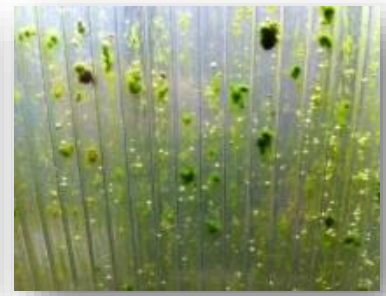


Fluid transfer and heating images



Possibility of heatlle panel

- Heat use in agriculture
- Livestock Wastewater Treatment
- Algae culture
- Bathtub heating
- indoor heating
- Air heating
- Plant Roof Cooling
- House cooling
- Mountain Hut Flo Heating
- PVT Combined Heat and Power
- ceiling cooling
- Wood and food drying
- Other alcohol fermentation

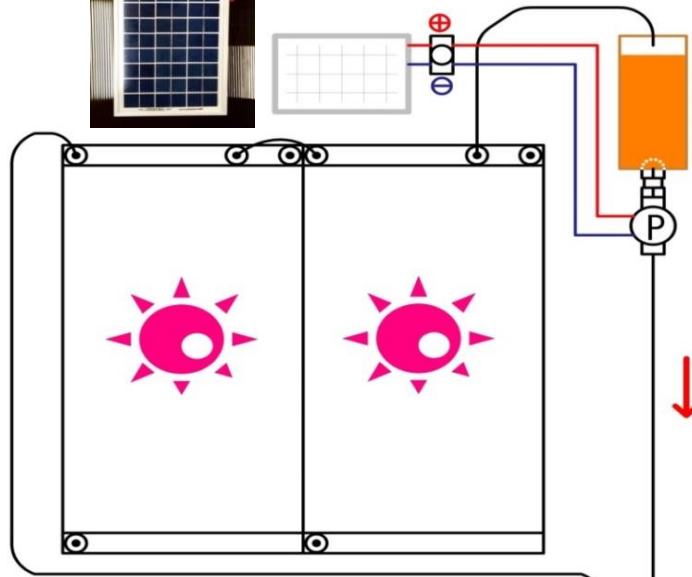


Providing DIY systems with bathtub heating

1. 2 heatl panels: Light-receiving area = 3.28 m2



3. Solar cell for pump drive: 12W



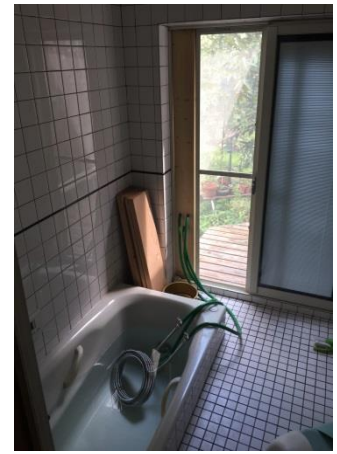
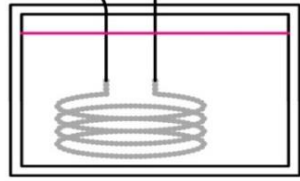
4. circulating water tank: double-layered structure



2. solar-powered heat-resistant pump: 15 W



5. Stainless steel heat exchanger: throw-in type



Off-grid type solar heat recovery system All can be DIY

1. 2 heatl panels: Light-receiving area = 3.28 m2
2. solar-powered heat-resistant pump: 15 W
3. Solar cell for pump drive: 12W
4. circulating water tank: double-layered structure, with trash removal mesh
5. Stainless steel heat exchanger: throw-in type

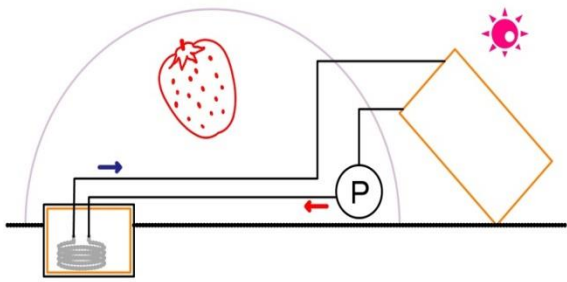
The pump is directly connected to the solar cell and starts running at sunrise and automatically stops at sunset.
Also, it hardly moves on cloudy or rainy days.

*Heatl panels are available as kits due to the rising cost of shipping.
Therefore, WE will ask you to purchase two sheets of hollow polycarbonate at your local home improvement center, etc.

Uses in Agriculture

It can be used as an auxiliary heat source for the house.

In progress:
We are currently promoting energy conservation in strawberry greenhouses.
It heats water in a 3-ton water tank to increase the temperature around the strawberry crowns.



Panoramic view of a tourist strawberry farm



Kerosene tank (bottom left), carbon dioxide tank (back right)



Heater (bottom left), bee box for pollination



raised-floor-style (granary, truck, etc.)



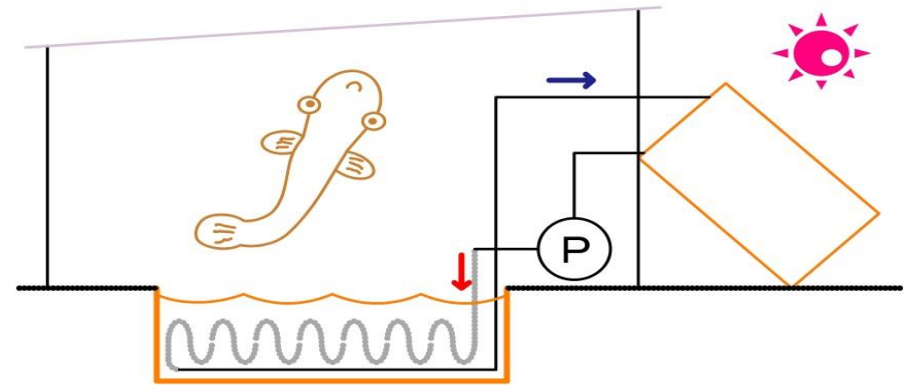
Liquid fertilizer controller (left), water supply tank (back right)



Usage in inshore aquaculture fisheries

It is used as an auxiliary heat source for fishponds.
Stainless steel flexible tubes are placed in the fishpond and heated.
By attaching a temperature controller, the pump can be stopped at a certain water temperature.

Suggested Use: Eels, shrimps, etc.



Eel farming requires a water temperature of 28° C even in winter.



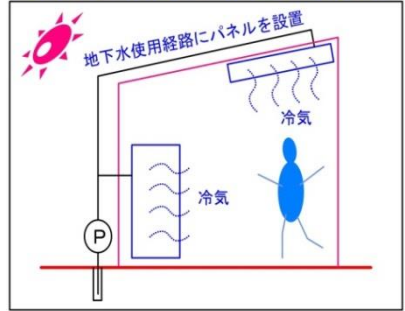
House cooling and coloring potential

地下水利用のついでに冷房！

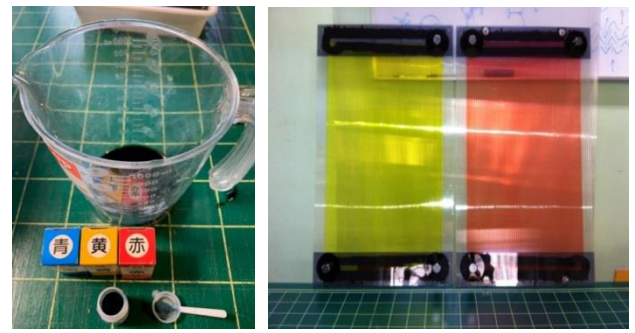
It makes it easier to work in the greenhouses during the summer.



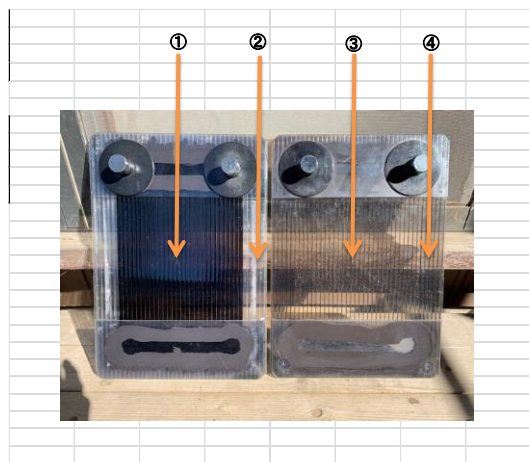
Suppresses CO2 emissions from the house ceiling.



Do different plants have their own preferred colors?
Three safe and inexpensive food coloring materials



By coloring the water black, the heat collection efficiency of transparent panels can be greatly increased.



Fluid center temperature comparison

frequency	(i)	(2)	$(1) \div (2) \times 100$
1	36.1	36.8	98.10
2	34.5	34.8	99.14
3	31.8	31.9	99.69
			98.97

Fluid-free edge comparison

frequency	(i)	(2)	$(1) \div (2) \times 100$
1	19.8	32.2	61.49
2	18.5	32.3	57.28
3	18.5	28.3	65.37
			61.38

Usage as PVT (combined heat and power)

Simultaneous recovery of heat and power.

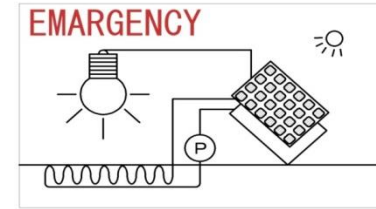
Bottom left

PVT integrated with film-type solar cells (manufactured by F-WAVE).

It is about the size of a tatami mat and weighs only about 8 kg, making it ultra-lightweight.

*Heat energy: approx. 780W

*Electrical energy: approx. 70 W



Proposed Use:

- 1) As a source of energy in a contingency
- 2) As an energy source for remote islands, mountain lodges, etc.
- (iii) As an energy source for developing countries
- 4) As an energy source for campers, trucks, etc.



Bottom center of photo

Siemens monocrystalline solar cell
70W

Transparent heatlle panel mounted
on the back



Lower right photo

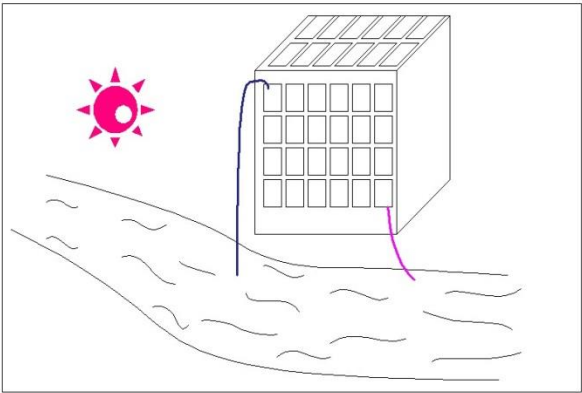
Spherical condenser panel 20W
Mounted on heatlle panel surface



Use as a heat exchanger in the building envelope

If there is a river or ocean nearby, the entire building envelope can be cooled.
A 1 mm layer of water absorbs almost 100% of infrared radiation above 3 μm .

Proposed use: factories and other buildings adjacent to rivers and the sea



Rooftop slab installation is not a problem to the extent that people walk on it.

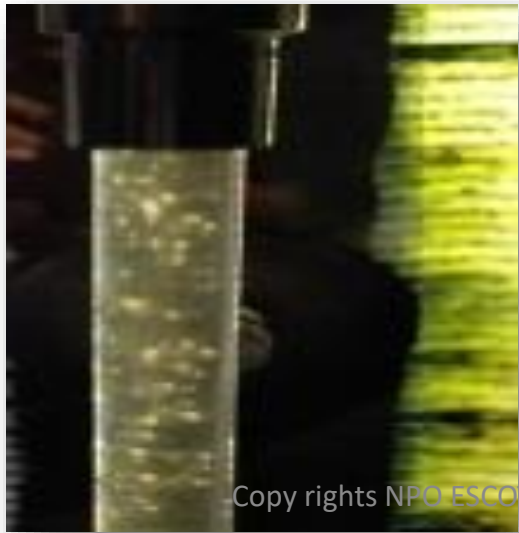
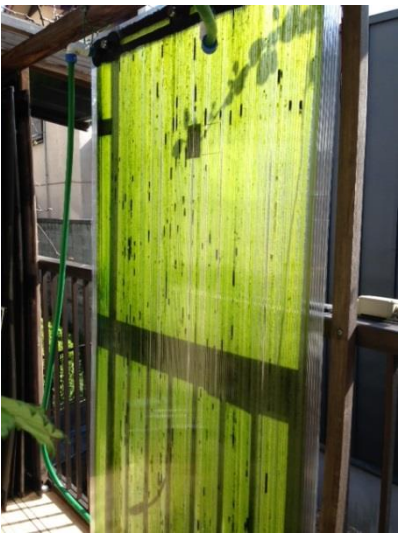
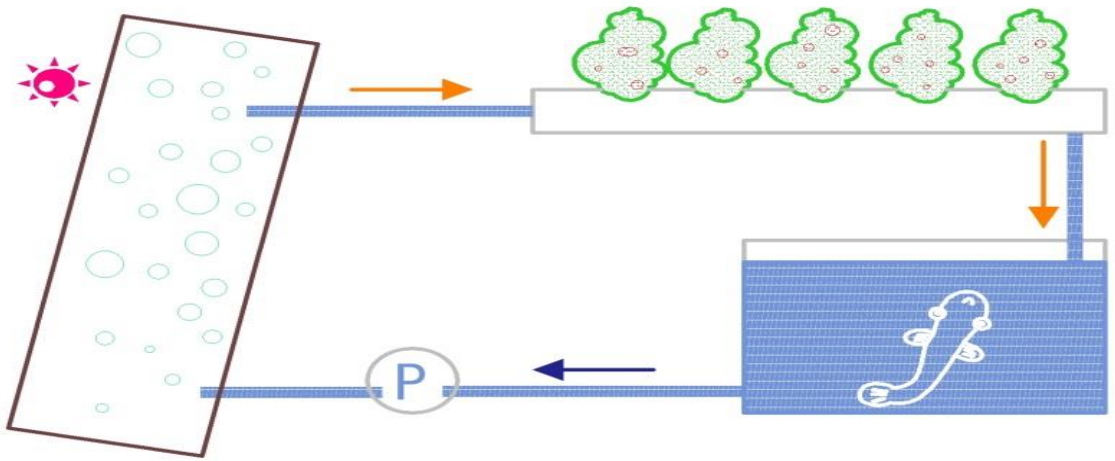


Strength test cleared

Usage as permaculture

When water is circulated in fishponds during the day, oxygen is created through photosynthesis. This oxygen can nitrate ammonia and decompose organic matter. As shown in the figure, a planting pipe (MGS) can be inserted into the flow path to create a hydroponic cultivation system.

Proposed use: Agriculture + Fishery collaboration system

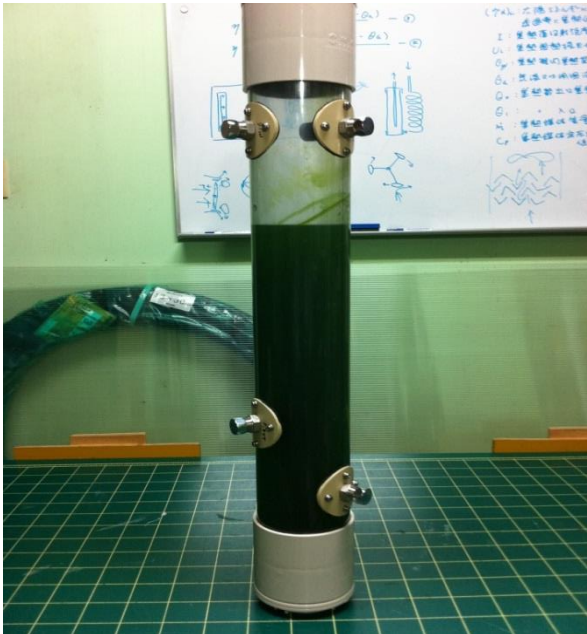
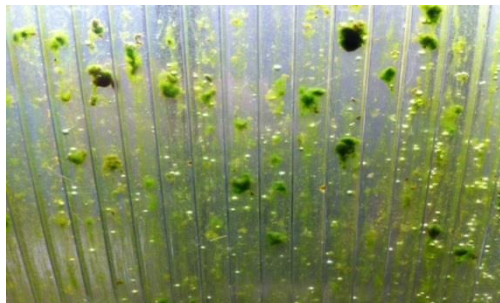
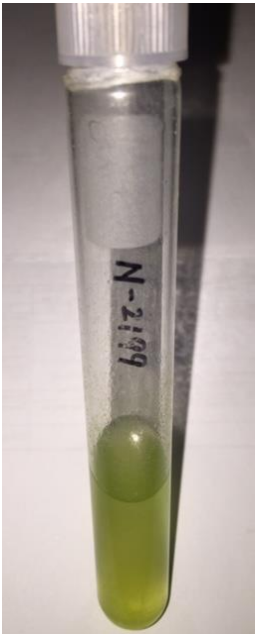


Algae cultivation and use as photocatalytic panels

Enables algae cultivation in closed
It can also be used as a testing device for photochemical reaction systems.

Proposed applications: Chlorella, oily algae culture, photocatalyst, optical filter, etc.

Oily algae: Botryococcus



Use as a heat source for wastewater treatment

It was used as a heat source for denitrification tanks in livestock wastewater treatment. In normal wastewater treatment, the water temperature is increased to increase microbial activity. The thermal energy is input because it is necessary.

Proposed application: Use in reaction tanks at general wastewater treatment plants



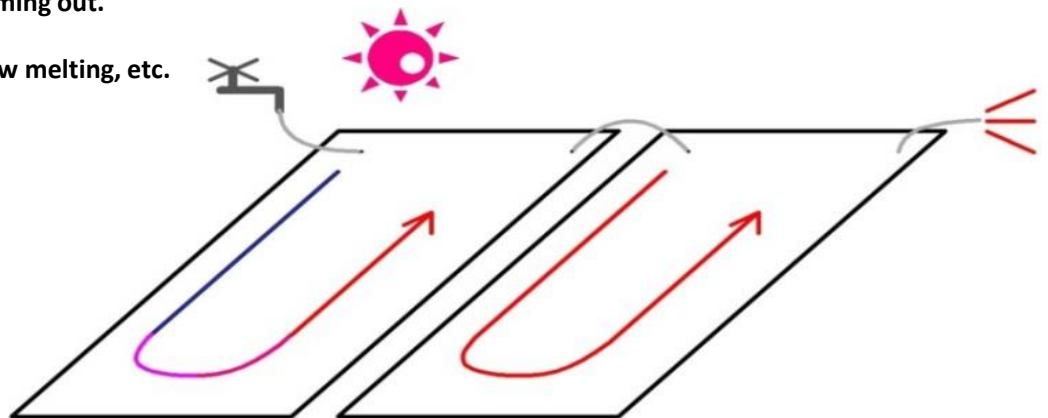
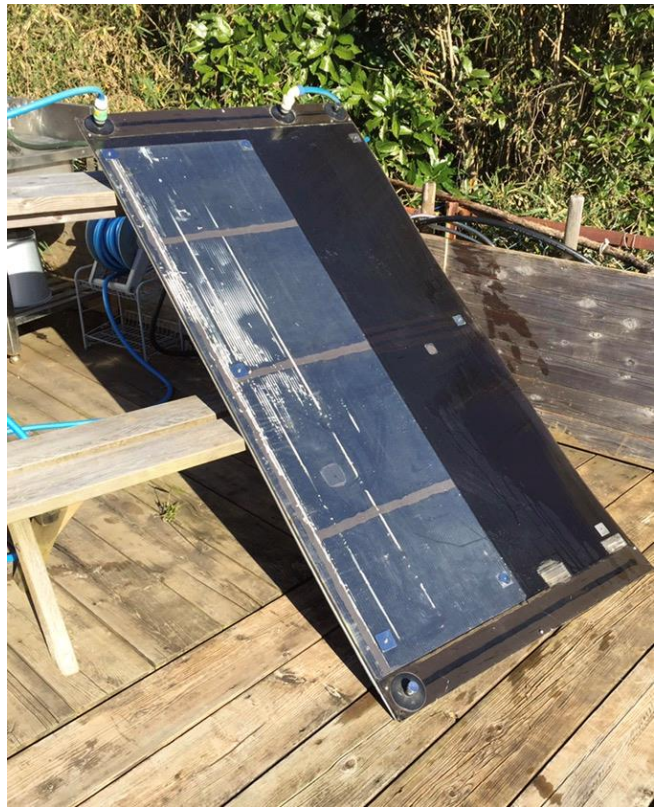
Easy to use - (1)

Directly connected to the faucet as part of the hose

It can be used to produce hot water from a hose placed in the sun.

What makes it different from a hose is that the hot water keeps coming out.

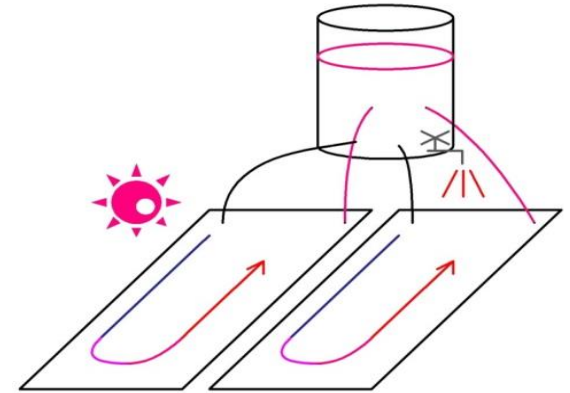
Suggested applications: showers at beaches and campgrounds, snow melting, etc.



Easy to use - (2)

This is a natural circulation type utilization method that takes advantage of the difference in elevation. The hot water is stored in tanks on the slopes and used. If you have a slope on the south side, by all means, try it.

Suggested use: Flo of mountain huts, etc.



strength test

Polycarbonate is a bulletproof glass material.
It will not collapse even if a car is placed on it.
Easily clears a depth of 6 m (0.06 MPa).
Average summer water temperature of approx. 70° C
Does not burn because it contains water.
Cleared freezing (-20° C)-thawing test 5 times.



test

Two heatl panels vertically installed on the south wall, one of which is double-layered with transparent hollow polycarbonate
Solar-powered heat pump directly connected to a DC12V (15W) solar cell to circulate hot water during the day
A 10-meter flexible pipe is submerged in the bathtub for heat exchange, but gas can also be used for reheating the bathtub.
Piping to the outdoors is done with unit take-out fittings.

Result: Bathing is possible without using gas on sunny days from April to November. Gas heating is required for winter bathing.



solar battery

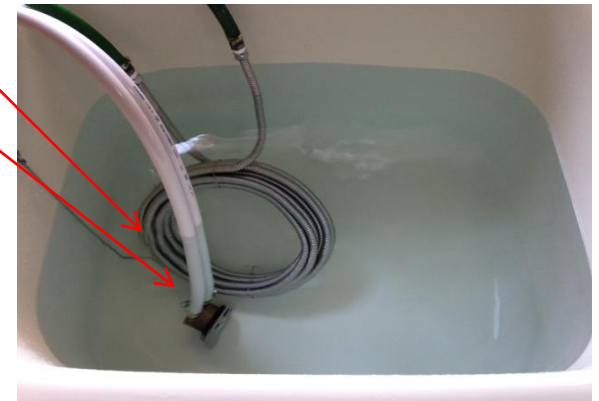
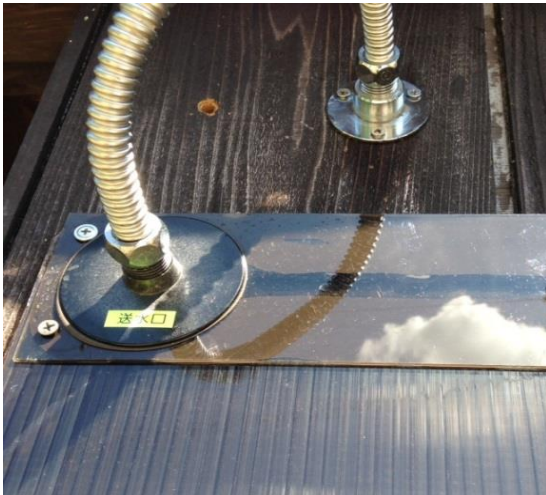
Heatlle panel (2-layered)

priming tank

Solar-powered heat-resistant pump

Flexible pipes for heat exchange

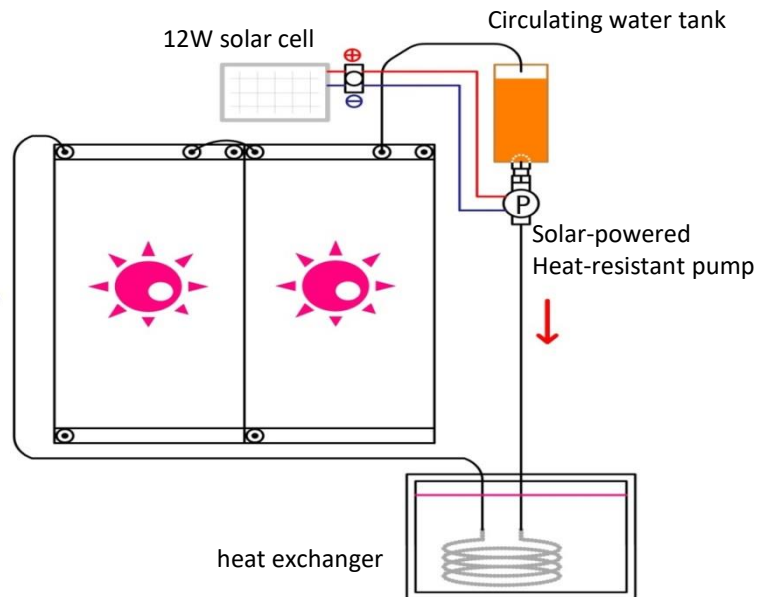
Unit for gas boiler



System Configuration:

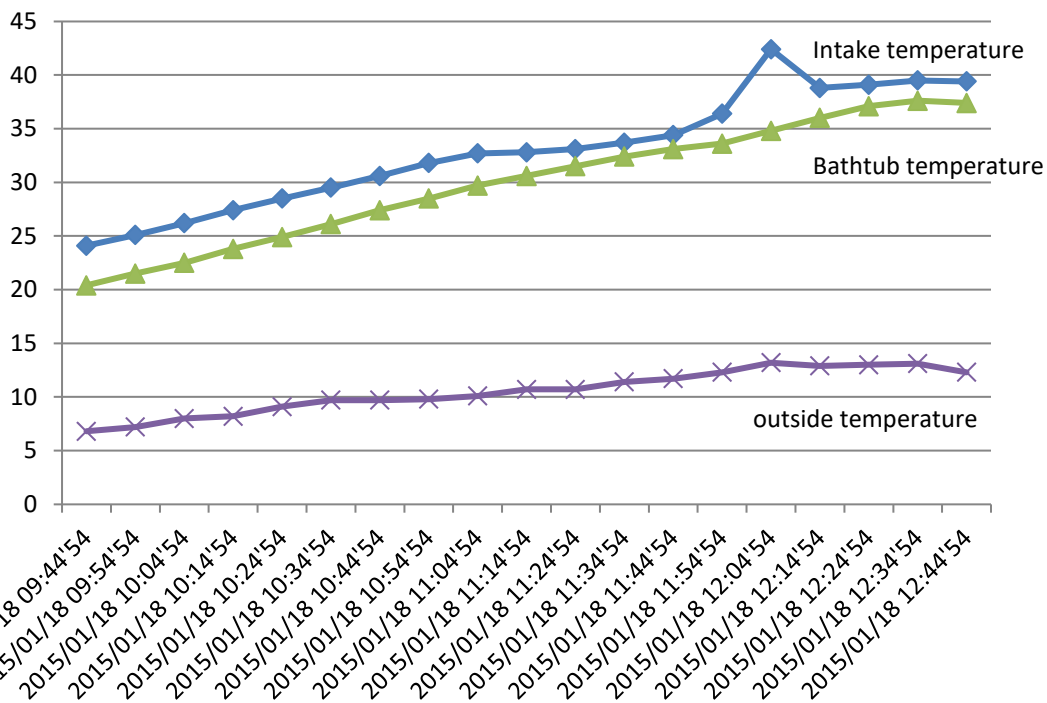
1. 2 solar thermal collectors
2. 12W solar cell
3. Solar-powered heat-resistant pump (110° C)
4. circulating water tank (with debris removal function)
5. heat exchanger (10m roll of stainless steel flexible tubing)

Exterior view of the test site



Winter Test Results

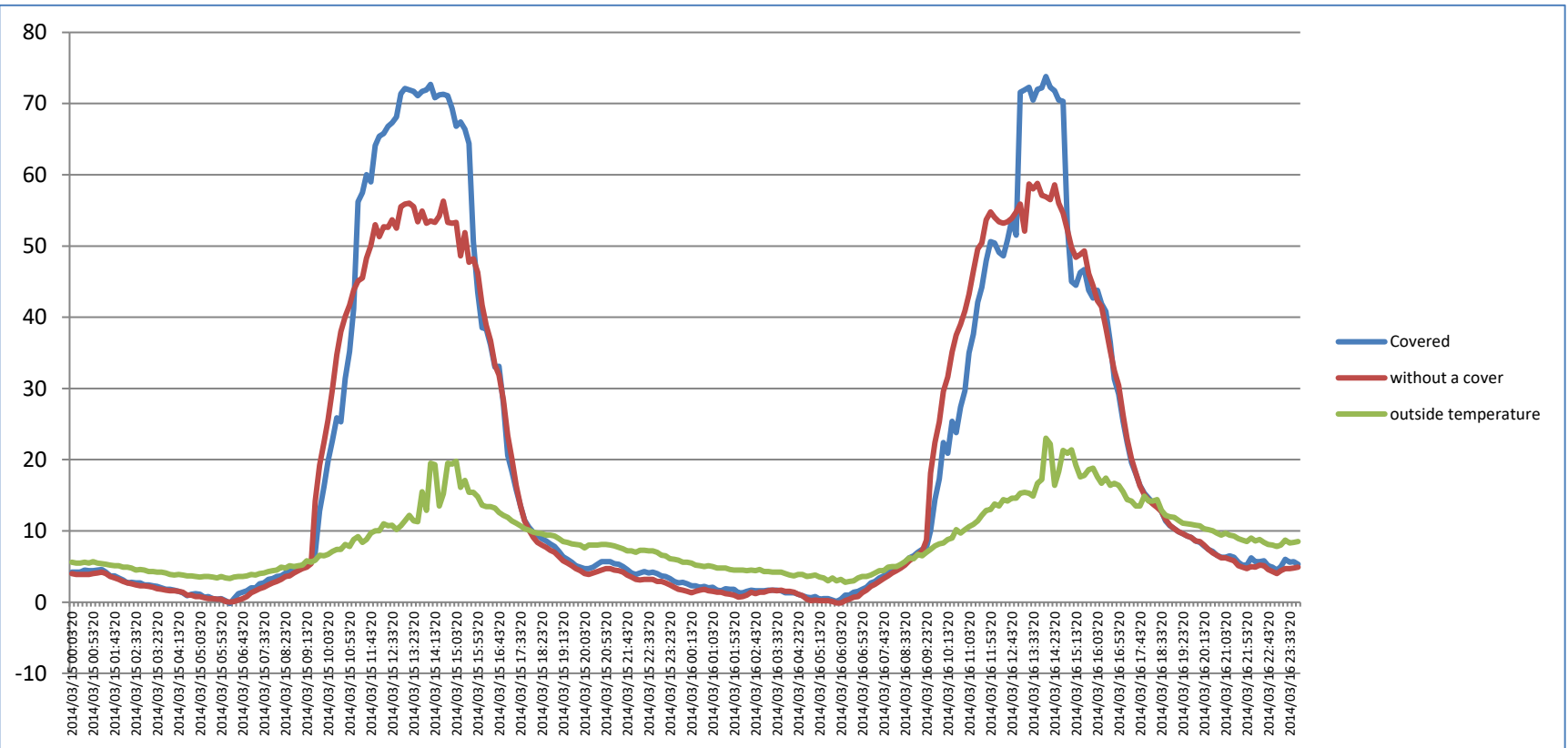
Winter Heat Recovery Test Graph January 18, 2015 Kamifuse Test Site, Oyado Town, Chiba Prefecture



- Terms:
1. light-receiving area: 2 panels (3.3m²)
 2. installation conditions: facing south, vertical wall installation
 3. heat recovery: stainless steel flexible tubing
 4. Pump water volume: approx. 10 $\frac{1}{2}$ ℓ/min (varies with solar radiation intensity)
 5. Bathtub water volume: approx. 150 liters
 6. Weather conditions: Clear skies (9:44 a.m. - 12:44 p.m.)
- Results:
1. bathtub rise temperature 17° C
 2. Recovered heat quantity: 2,250 Kcal
 3. recovered energy: 10.66 MJ
 4. solar radiation at this time of day: 7.71 MJ
*Calculated from NEDO database
 5. Energy efficiency: approx. 42%.
 6. Loss in piping and bathtub: approx. 6%.

Comparative study with 2-layered panels

The panel with 4 mm transparent polycarbonate added to the surface recorded a water temperature 50° C higher than the outside temperature.
Location: Kashiwa City, Chiba Prefecture Azimuth: South south-southwest, angle to the ground: 22.5° , *No-load comparison test



servicing

Part of a panel at the Kamifuse Test Site, Oyado Town, was damaged and repaired due to strong winds from Typhoon No. 9, which made landfall in Tateyama, Chiba Prefecture, on August 22, 2016.

Situation: As a result of the rope breaking off the heated panel that was suspended by a rope, two nozzles to which hoses were attached were damaged by wind pressure (see photo above).

In addition, two scratches were found on the light-receiving surface, probably caused by flying debris (see photo below).

Repair:

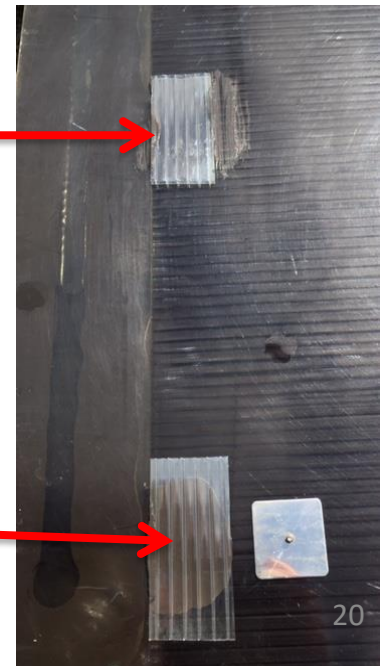
Photo above: The nozzle with a broken threaded part is stripped with a spatchera and the silicone is scraped off, then replaced with a new nozzle. (Working time: about 15 minutes)

*Measures: Reconsideration of glass fiber content in materials has been initiated.

Bottom photo: The scratched light-receiving part is repaired by cutting a square piece of hollow polycarbonate (transparent) and pasting it over the light-receiving plate. (Working time: about 10 minutes)



Silicone coated polycarbonate for repair



Instantaneous heat collection efficiency of approx. 48

Number of tests (10 minutes each)	1st	2nd	3rd
Measurement Time	13:42	13:48	13:55
Flow rate (CC/SEC) = m	32.7	32.7	32.7
Solar radiation intensity = I	1203	1227	1230
Sensitive area = A	1.64	1.64	1.64
Inlet water temperature Tin	21.5	21.5	21.5
Outflow water temperature Tout	28.7	28.6	28.5
Efficiency η =	50.00	48.34	47.55
Average efficiency η_{avg} =			48.63



simulation

requirement	summertime	Spring & Autumn	winter	unit
solar thermal energy	1200	1000	800	w/m2
Light to Heat Conversion Efficiency	48	48	48	%
Light-receiving area (for 2 panels)	3.28	3.28	3.28	m2
Energy recovery	113	94	76	KJ/mini
Fluorourethral volume	180	180	180	リットル
Heating temperature	20	20	20	°C
Thermal energy required	15,048	15,048	15,048	kJ
the time required	2 hours 12 minutes	2 hours 39 minutes	3 hours 19 minutes	

specification document

specification document	
Solar thermal collector type	Flat flexible type, heat collector
Model name	Heatle Panel
Dimensions (mm)	910x1810x4.5 (photosensitive area)
Weight (kg)	2.7
Heat collection area (m2)	1.64±0.01
Water storage capacity (liter)	approximately 6
Photodetector Material	polycarbonate
Maximum working pressure (Pa)	30KPa (test pressure 60KPa)
Piping nominal size	1/2", flat male thread
Heat collection efficiency	48% (1 layer + rear black hollow plate insulation)

Installation location/application	
Location	roof surface
	surface of a wall
	slope
	Hanging installation (using wire)
	Rooftop slab surface
	Balcony walkway
Possible uses	Solar Heat Recovery
	Simultaneous recovery of solar heat and electricity
	Photosynthetic aerator
	Algae Reactor
	Underwater Bacteria Sterilization
	Hot air recovery
	Indoor natural ventilation

winning (a prize) ENERGY GLOBE NATIONAL AWARD 2016



Global Energy Award and presentation at the Austrian Embassy



ENERGY GLOBE FOUNDATION

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About

Energy Globe Foundation is a non-profit organization founded by Austrian energy pioneer, Wolfgang Neumann. Building on 30 years of experience in the area of energy efficiency and renewable energies, Energy Globe Foundation is a global leader in the area of sustainability.