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PROJECT SUBMISSION CHECKLIST

PART I - GENERAL CONTACT INFORMATION

1.1 CONTACT DETAILS OF ORGANIZATION

(only relevant if submitted by an institution/company/organization - individuals please complete 1.2)

Full Name of institution/ company/organization:	NPO ESCOT (Joint research with Shibaura Institute of Technology)		
Street and street number:	4-17 Azumakami-cho		
Postal code:	277-0011	Town:	Kashiwa, Chiba
Country:	Japan	Official homepage:	http://npo-escot.org
Telephone: (including country code; no brackets or slashes)	81-80-4365-0861	Official company email: (i.e. info@examplecompany.com)	info@npo-escot.org

1.2 INDIVIDUAL CONTACT DETAILS

Given name:	Haruo	Family name:	Fujimoto
Academic title:	Master of Environmental Studies	Gender: (please mark with x)	(x) Male / ( ) Female
Street and street number:	4-17		
Postal code:	277-0011	Town:	Kashiwa, Chiba
Country:	Japan	Email (of contact person):	ser.kashiwa@gmail.com
Telephone: (including country code; no brackets or slashes)	81-4-7166-4128	Mobile Phone: (including country code; no brackets or slashes)	81-80-4365-0861

PART II - PROJECT INFORMATION – OVERVIEW

2.1 GENERAL INFORMATION

Project title:	Ocean CO2 capture and sea surface temperature cooling technology demonstration project		
Category: (please mark with x, choose only one category)	( ) Earth ( ) Fire ( ) Water (x) Air ( ) Youth	Status of implementation: (please mark with x)	( ) Planned (x) Implemented project or ongoing project
Country of implementation: (choose only one)	Japan	Optional: additional countries of implementation:	

2.2 PROJECT SUMMARY

Please summarize (~10-15 lines,) what the project is about and what major outcomes have been achieved (please state concrete figures), especially any relevancy in regard to environmental protection, improvement of living and/or economic conditions, awareness creation, emission reduction, renewable energy, energy and resource efficiency, counteracting climate change, etc.; Please use a formal writing style as this summary will be published in our online database (use your/your organization's name in the text and do not use expressions like We, I, our company, etc.).

This project is about disseminating the latest technology that enables ocean phytoplankton to absorb CO2 and cool sea surface temperature. NPO ESCOT and Shibaura Institute of Technology have been researching and developing a check valve type upwelling pump that pumps bottom water to the surface by wave vertical motion.

After trial and error, we succeeded in developing a check valve that can handle a wide range of wave characteristics, from small waves of only a few centimeters to large swells.

The pumping of nutrients promotes photosynthesis of phytoplankton and serves as a <biological pump> that causes a large amount of CO2 to accumulate in the ocean during the subsequent food chain.

At the same time, the pumping of bottom water promotes vertical agitation of seawater, and has the effect of suppressing the amount of water evaporation in summer.
This can be expected as a concrete measure to reduce the damage caused by floods and typhoons by suppressing the amount of water vapor generated due to the rise in sea surface temperature.

PART III – DETAILED PROJECT INFORMATION

Please provide **a complete and proper description at the jury's request**.

A) INITIAL SITUATION AND CONTEXT OF THE PROJECT/INITIATIVE

Please provide information (max half a page, 2000 characters) on the initial situation (problems, challenges) before the project was implemented. Depending on the type of project, please include the environmental, ecological, economic, social, energy or other relevant context of your country.

Declining fish stocks due to climate variability increase the risk of a global food crisis.
The origin of the food chain in the ocean is fine phytoplankton.
Rising sea surface temperature suppresses the occurrence of upwelling, resulting in a lack of nutrients in the ocean.
This reduces the CO2 absorption capacity of phytoplankton and accelerates global warming.
Looking at the current situation from the perspective of natural disasters, in recent years, the frequency of typhoons becoming larger and heavy rain damage exceeding expectations has increased in Japan.
In September 2020, a super-large typhoon No. 10, which is expected to have a maximum instantaneous wind speed of 80 m / sec, is expected to land in the Kyushu region, and a wide range of emergency declarations have been issued.
Fortunately, due to the decrease in sea surface temperature caused by the agitation of sea water caused by typhoon No. 9 that passed just before, the course changed to the west where the sea surface temperature was high, and the crisis was barely escaped. (Analysis result of Japan Meteorological Agency)
Taking this opportunity, the importance of this project, which has been carried out so far to bring about a decrease in sea surface temperature, has been reaffirmed.
In other words, the rise in sea surface temperature has a negative effect on CO2 absorption by phytoplankton and at the same time contributes to the increase in size of typhoons.

B) DESCRIPTION OF PROJECT OBJECTIVE AND MOTIVATION

What was your overall motivation to start this project and what have been the project's objectives? (max half a page, 2000 characters)

It is the establishment of technology that enables both absorption and immobilization of CO2 into the ocean and suppression of sea surface temperature rise.

C) SCOPE AND IMPLEMENTATION ACTIVITIES

Please describe in more detail (max half a page, 2000 characters) the scope of the project and the major activities that have been conducted for its implementation.

Shallow waters, coasts, harbors and estuaries around the world can be areas where projects can be implemented.
For implementation, a check valve developed for wave motion is attached to the upper part of an inexpensive pipe such as a drain pipe, and the floating body is hung in the sea with a rope.
Floating bodies on the surface of the water pump up bottom water to the surface by moving up and down by wave

In the research and development so far, we have improved the check valve structure that efficiently upwells even from large waves with long periods to small waves of several centimeters.
Also, in the field of marine products such as oysters and seaweed, we have made different optimizations for each characteristic of marine products through equipment provision and hearings.

On the other hand, various evaluations such as pumping amount calculation, shape analysis, and water surface cooling effect of the check valve type spring pump have been carried out under the cooperative research system with Shibaura Institute of Technology and Tanaka Laboratory.

D) INNOVATION

Please describe the innovative aspects of your project under consideration of the technological standards and conditions (i.e. regional conditions, social conditions, economic conditions or political situation) of your country (max half a page, 2000 characters).

<BLUE CARBON> RELATED TECHNOLOGY THAT CAPTURES AND IMMOBILIZES CO2 IN THE OCEAN IS BECOMING MORE IMPORTANT YEAR BY YEAR.
THE AMOUNT OF CO2 ABSORBED ON LAND SUCH AS FORESTS IS 2.2 BILLION TONS PER YEAR, WHILE THE AMOUNT ABSORBED IN THE OCEAN IS 2.6 BILLION TONS, WHICH SHOWS THE GREAT ROLE OF THE SEA AS A MEASURE AGAINST CLIMATE CHANGE .
UNDER THESE CIRCUMSTANCES, A LARGE-SCALE DEMONSTRATION TEST TO ARTIFICIALLY GENERATE UPWELLING WAS CONDUCTED IN JAPAN UNDER THE INITIATIVE OF THE GOVERNMENT.
THE APPROACH IS DUE TO THE OCCURRENCE OF UPWELLING DUE TO CHANGES IN THE TOPOGRAPHY OF THE SEAFLOOR, WHICH REQUIRES A LARGE COST.
IN ADDITION, THE LAYING OF THE ARTIFICIAL UPWELLING STRUCTURE ITSELF WAS ACCOMPANIED BY A LARGE AMOUNT OF CO2 GENERATION.
IN ADDITION, A TEST WAS CONDUCTED IN WHICH A PUMP WAS DRIVEN BY A SOLAR CELL TO PUMP UP BOTTOM WATER, BUT IT HAS NOT BEEN WIDELY USED SO FAR IN TERMS OF DURABILITY AND WEATHER RESISTANCE.
IN THIS PROJECT, A CHECK VALVE TYPE UPWELLING PUMP DRIVEN BY WAVES WILL BE USED AS THE VERTICAL UPWELLING MEANS.
UNTIL NOW, MOST WAVE-TYPE PUMPS HAVE BEEN MECHANICALLY DESIGNED ASSUMING PUMPING TO A POSITION HIGHER THAN THE SEA LEVEL.
HOWEVER, SUCH A PUMP CAUSES COMPLICATED EQUIPMENT STRUCTURE AND HIGH COST, AND AS A RESULT, IT HAS NOT BEEN PUT INTO PRACTICAL USE.

ONE OF THE INNOVATIONS OF THE CHECK VALVE TYPE UPWELLING PUMP IS THAT THE BASIC STRUCTURE IS SIMPLIFIED BY NOT

PUMPING ABOVE THE SEA LEVEL.
AT THE SAME TIME, THIS REDUCED THE RISK OF PUMP DESTRUCTION DUE TO TYPHOONS, HIGH WAVES, ETC.
THERE IS A DEVELOPMENT OF A CHECK VALVE STRUCTURE THAT CAN HANDLE LONG-PERIOD SWELL (LOW ACCELERATION) WAVES THAT DO NOT WORK WITH ORDINARY CHECK VALVES TO RIPPLES (SMALL AMPLITUDE) OF SEVERAL CENTIMETERS.

FURTHERMORE, BY USING A THICK PIPE FROM A SPECIFIC POSITION AT THE BOTTOM TO THE BOTTOM, THE OVERALL WEIGHT WAS REDUCED TO REDUCE WORKABILITY AND COST AT SEA.

A HIGHLY VERSATILE MATERIAL CAN BE SELECTED AS THE CONSTITUENT MATERIAL OF THE CHECK VALVE, AND IT CAN BE MANUFACTURED WITH SIMPLE PROCESSING TECHNOLOGY AND TOOLS.
OTHER MATERIALS ARE ONLY SEWAGE PIPES (PVC PIPES) AS UPWELLING PIPES, FISHING BUOYS AS FLOATING BODIES, AND ROPES AS CONNECTING TOOLS.
THE PROJECT PLANS TO RELEASE A CHECK VALVE MANUFACTURING METHOD MANUAL FREE OF CHARGE.
IT IS ALSO IMPORTANT THAT FISHERMEN CAN EASILY INTRODUCE AND UTILIZE IT.

WHEN THE FLOATING BODY IS PULLED UPWARD BY THE WAVE, THE CHECK VALVE CLOSES (SEALED) WITH RELATIVE WATER PRESSURE FROM TOP TO BOTTOM, AND THE ENTIRE SEAWATER IN THE PIPE IS PULLED UP.
IN THE SUBSEQUENT DOWNWARD CYCLE, THE CHECK VALVE OPENS DUE TO THE RELATIVE WATER PRESSURE FROM THE BOTTOM TO THE TOP, AND THE SEAWATER IN THE PIPE IS DISCHARGED NEAR THE SEA SURFACE.
THIS PRINCIPLE IS COMMON TO THE WELL DIGGING MECHANISM CALLED <KAZUSA DIGGING>, WHICH DIGS SOIL TOGETHER WITH MUDDY WATER.
IT RAISES THE NUTRIENTS ACCUMULATED ON THE SEABED AND GIVES IT A FUNCTION AS A BIOLOGICAL PUMP STARTING FROM THE INCREASE IN PHYTOPLANKTON.
AT THE SAME TIME, IT HAS THE EFFECT OF SUPPRESSING THE RISE IN SEA SURFACE TEMPERATURE BY PUMPING THE BOTTOM WATER, WHICH HAS A LOWER WATER TEMPERATURE THAN THE SURFACE LAYER.

E) IMPLEMENTATION AND COSTS

- For projects including a **technological component**: Please describe the technology applied, as well as the costs and economic benefits (max half a page).
- For projects including a **social component**: Please describe the approach that you have chosen as well as the social impact of your measures had on which target groups. (max half a page, 2000 characters).

Human and economic losses due to damage to buildings due to large-scale disasters caused by rising sea surface temperatures are increasing year by year.
In the near future, it may even change the budget structure of national and local governments.
A few years ago, insurance premiums began to rise due to increased insurance payments by insurance companies.
Since the insurance premium rate is calculated for past damage, this tendency is expected to continue in the future.
The IPCC has released estimates that the amount of water vapor will increase by 7% when the temperature rises by 1 ° C.
If temperatures continue to rise, the health of countries, individuals and ecosystems will eventually be jeopardized.

As a result of the research so far, the following points have been clarified in this project.

1) Upwelling from the deep layer to below the surface of the water (pumping seawater) can be realized with a check valve type upwelling pump, which is sufficient to achieve the purpose.
2) Check valve type upwelling pumps can be manufactured at low cost (about 1000 euros / unit) in most countries by diverting water pipes, fittings, etc.
3) The point in creating a check valve is to improve the airtightness between the valve size exceeding the upwelling pipe size and the upwelling pipe.
4) The parameter that affects the amount of upwelling
Cross-sectional area of upwelling pipe
Vertical displacement of floating body
Buoyancy of the float
Frequency of vertical movement
Vertical movement speed (calculated from mutation and cycle)
Fluid resistance of the entire check valve upwelling pump (including the surface), including opening and closing the valve

*** A trial calculation that does not include fluid resistance (upwelling pipe length) allows pumping of 1000 tons / day.**

Upwelling tube diameter (cm) 20 cm2
Vertical displacement (cm) 200 cm
Vertical movement cycle (sec) 10 sec
Pumped amount (day) 1085.18 ton

Contents of experiments to be continued in the future
1) Formulation of formula for pumping amount
2) Development of a new jig that accelerates the increase of nutrients in the bottom layer
3) Collaboration with fishing reefs, offshore wind turbines, etc.
4) Countermeasures against shellfish adhesion, plastic dust clogging

F) DESCRIPTION OF ACHIEVED RESULTS

Please describe in detail all direct and indirect results. Depending on your project, please focus especially on environmental and/or social and/or economic impacts resulting from the implementation of your initiative. Where possible, please include figures (i.e. number of people trained or jobs created, tons of CO^2 avoided, m^3 of water treated, MWh of renewable energy provided, energy efficiency before/after renovation, tons of waste collected/reduced, number of trees planted, etc.) or descriptions on how people or environment have otherwise benefitted from your project (max half a page, 2000 characters).

As a result of the worldwide spread of check valve type upwelling pumps, the following effects can be expected.

"Short-term effect"
1) Recovery of marine resources in the implementation area
2) Measures against heat island in peripheral urban areas
3) Creation of green employment related to the manufacture and installation of check valve type upwelling pumps
4) Securing CO2 reduction credits for plankton increase (assuming plankton CO2 recovery and quantification of fixed amount)
"Long-term effect"
1) Delay climate variability due to CO2 absorption and immobilization.
2) Suppress the growth of typhoons and reduce the risk of floods by suppressing the generation of water vapor.
3) Greatly contribute to the world's goal of zero real CO2 emissions.
"Reference material, carbon fixation amount"
Atmospheric carbon storage inventory 829 billion tons
Onshore carbon storage of 2.47 trillion tons
Ocean carbon storage 38,155 billion tonnes

G) REPLICATION POTENTIAL (MODEL CHARACTER)
Please describe the replication potential of your project in other regions or countries (max half a page, 2000 characters).

A wider range of activities, including NGOs, can participate in this project.
In addition, the main materials are drainage pipes (PVC pipes), buoys, and ropes that are found anywhere in the world.
To install, simply connect the check valve type upwelling pump and buoy with a rope and hang them in the sea. It is also possible to connect with existing buoys and floating bodies.
If a fishing ground can be created by laying a large number of check valve type upwelling pumps near the shore, stable fishing with small boats may be possible.

PART IV – PHOTOS AND PROJECT DOCUMENTATION

Please send 4-6 photos in print quality (~400 kb – 3 MB per picture) which document your project well. Preferred file format .jpg or .gif
You can also upload additional project material.
Upload these materials as part of your online-submission on www.energyglobe.info/participation/

PART V – FINAL INFORMATION AND AGREEMENTS

5.1 HOW DID YOU HEAR ABOUT THE ENERGY GLOBE AWARD?
Please mark all answers that apply with x.

(x) Mail by Energy Globe	( ) Print media	( ) Friends/Colleagues
( ) Call by Energy Globe	( ) Facebook	( ) Google
( ) Internet	( ) Radio/TV	( ) Conferences/Fairs
( ) Contact by Energy Globe Ambassador		( ) Other

5.2 SUPPORT BY ENERGY GLOBE PARTNER
In the future there is a possibility that selected projects with exceptional prospects are supported by an ENERGY GLOBE Partner on their way towards marketability with management, sales and distribution know-how, as well as financially. If you are interested in this possibility, please mark the yes field with x.
(x) Yes / ( ) No

5.3 STATEMENT OF AGREEMENT (ACCEPTANCE IS OBLIGATORY for submission)
By participation in the ENERGY GLOBE Award competition I agree to the electronic processing, sharing within the ENERGY GLOBE partner network and publication of my project.
I herewith declare, that my statements regarding the submitted project are complete and correct and may in part or in total be published by Energy Globe. Energy Globe shall not be liable for the correctness and completeness of these statements. In case of any law suits or litigation, e.g. regarding copyright or publishing right, the submitter is responsible that Energy Globe shall not be involved in any such law suits or litigations. The submitter shall in any case completely indemnify Energy Globe against all effects resulting from such law suits or litigations. By marking the yes field with x, I confirm agreement with this declaration and the resulting legal consequences (Acceptance is required for submission). Please mark the corresponding field with x.
(x) Yes / ( ) No

Thank you for completing the required information.
We kindly ask you to submit your project information online on www.energyglobe.info/participation/

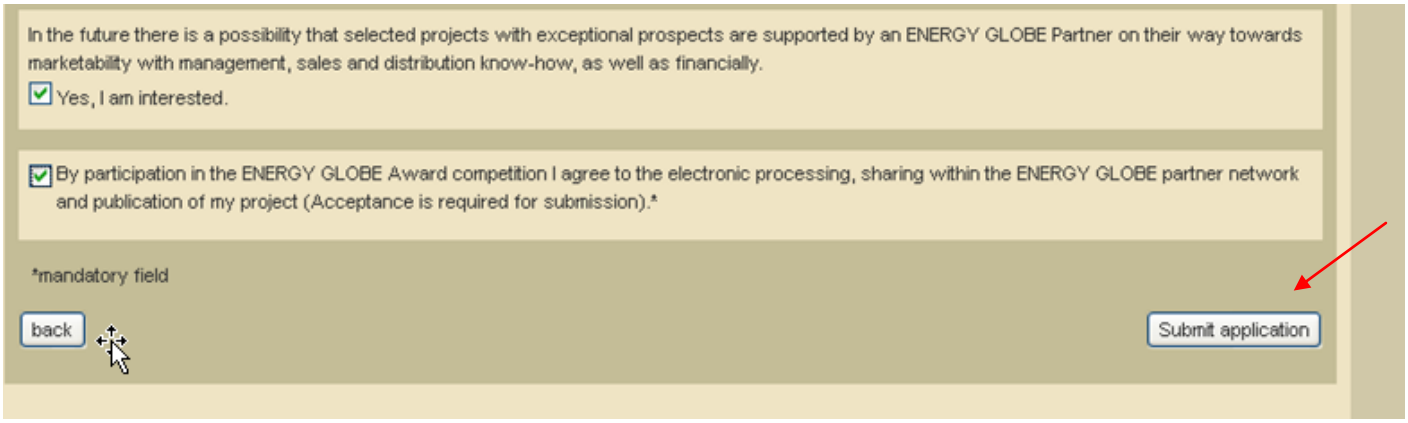
For organizational reasons please do not send this file via email. You can simply copy/paste the entered information with Ctrl-C/Ctrl-V into the online form. Thank you for your support.

After submitting your project online, **please check whether we have received it successfully!**

1. Fill in all required texts and upload all documents and click at the **"Submit application"- Button.** (Please see screenshot below)
   We do not receive your texts and documents until you click on this button.

2. Check your Email-Inbox if you have received an email-confirmation at the email address provided. (also check your Spamfile).
   Subject of this email: Your project application has been successfully received (ID: AWD0000)

3. Email us at contact@energyglobe.info in case you do not receive the confirmation email.



Categories:

EARTH:
Projects relating to agriculture, crops employable for energy, building materials, insulation, solar energy and overall energy efficient construction

FIRE:
Projects relating to energy production, the efficient and sustainable use of energy in all fields of application

WATER:
Projects relating to the use and processing of drinking water, waste water management as well as the preservation of water reserves

AIR:
Projects relating to air pollution management – indoor and outdoor – improving air quality, overall climate protection and the reduction of CO2

YOUTH:
All sustainable projects to or implemented in conjunction with young people to improve environmental awareness