Prototype **ALGAE SERVICE L**
for cyanobacteria collection

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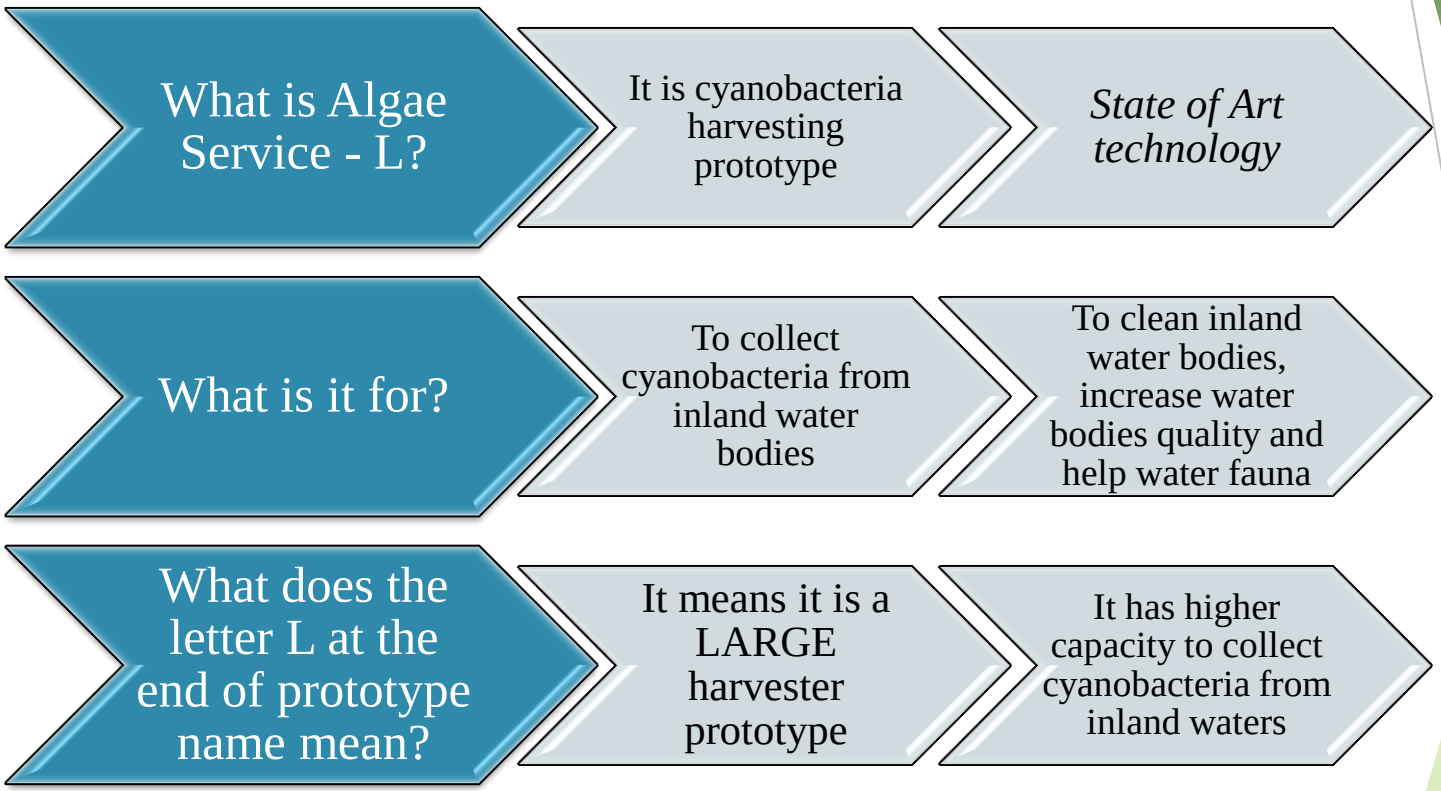
Project title:
ALGAE – ECONOMY BASED ECOLOGICAL SERVICE OF AQUATIC ECOSYSTEMS
(**LIFE17 ENV/LT/000407**)

2022.09.06

Algae Service L (AS-L)



Algae Service – L creation timeline (2020-2022)

Projection

Work done:

– 400 technical drawings
– 350 engineering work drawings (dxf files)
– Hydraulic calculations
– Hydrostatic stability calculations
– Electric scheme preparation
– Prepared building project

Manufacturing

Work done:

– Selection of needed equipment
– Selection of proper materials
– Manufacturing of separate parts: prototype body, microfiltration equipment, drainage system, collection system
– Instalation of eco friendly equipment: biodiesel engine, solar panels.

Receiving of permits

Work done:

– Prepared and approved patent
– Approved building project
– Building supervised by authorities
– Inspected and approved by Lithuanian Transport Safety Administration
-Registration of AS-L

Testings and improvements

Work done:

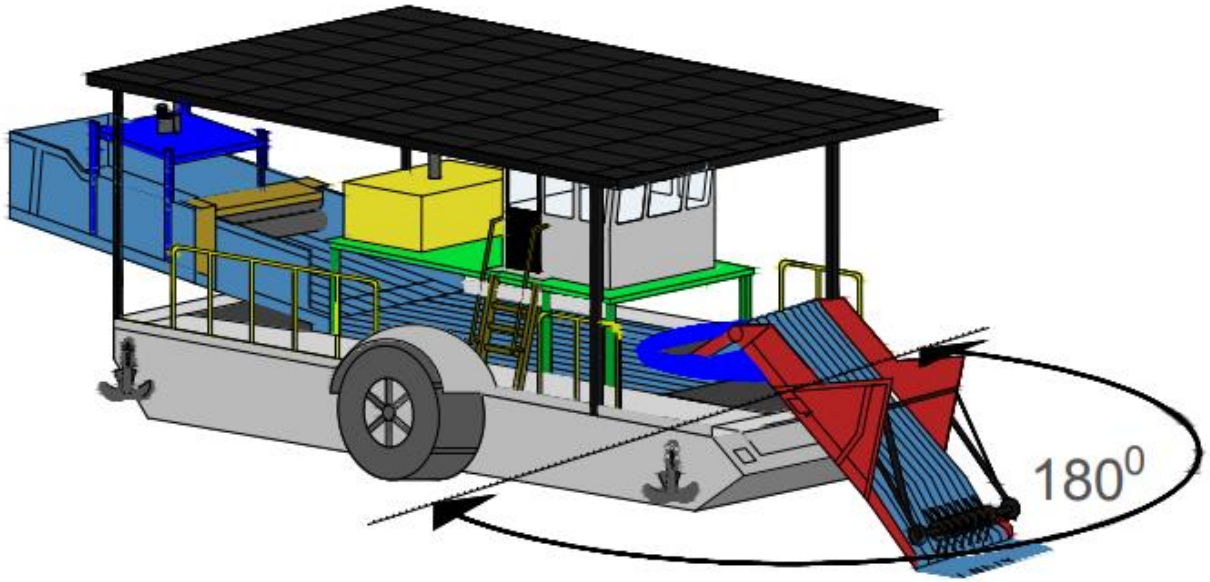
– up to 40 separate parts testings
– more than 10 testings in Kaunas lagoon
– more than 7 corrections and improvements on separate parts
– more than 5 different designs

Exploitation

Work done:

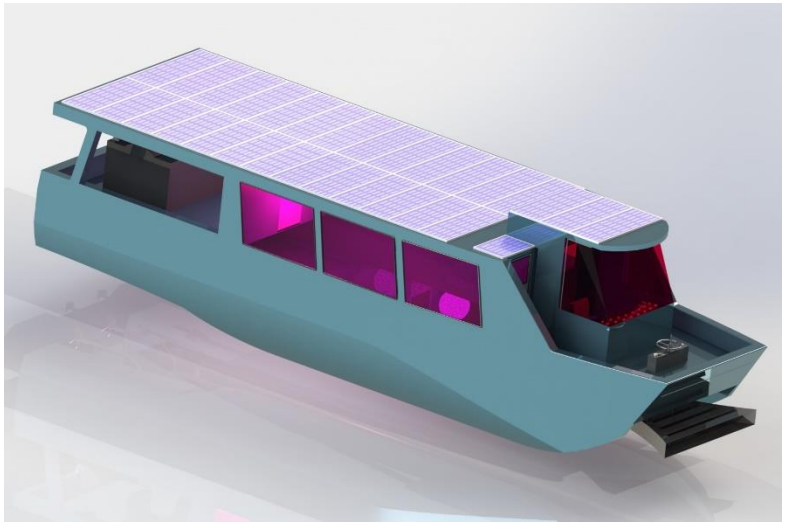
– Prepared full safety equipment and manual instructions
– Manufactured and tested cyanobacteria unloading
– Cyanobacteria collection in Kaunas lagoon
– Accumulated solar power

Algae Service L creation metamorphoses

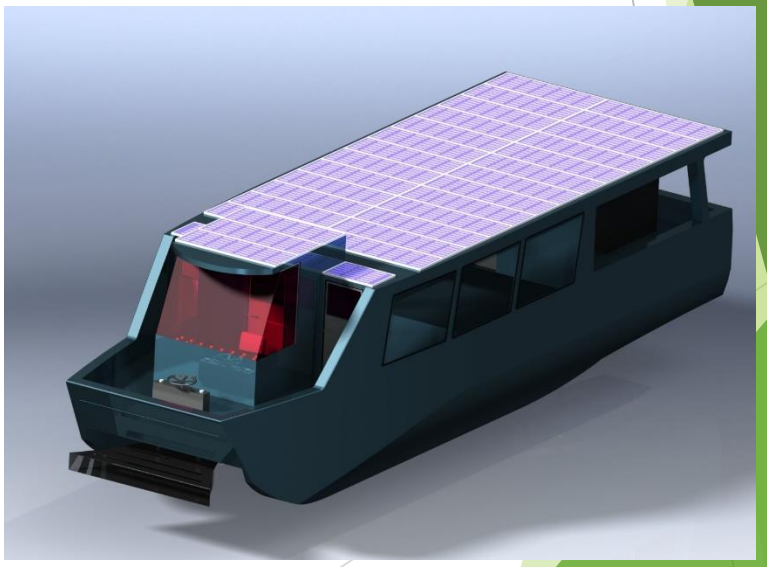


1St version of AS-L
LIFE Application- *The Winner (2018)*

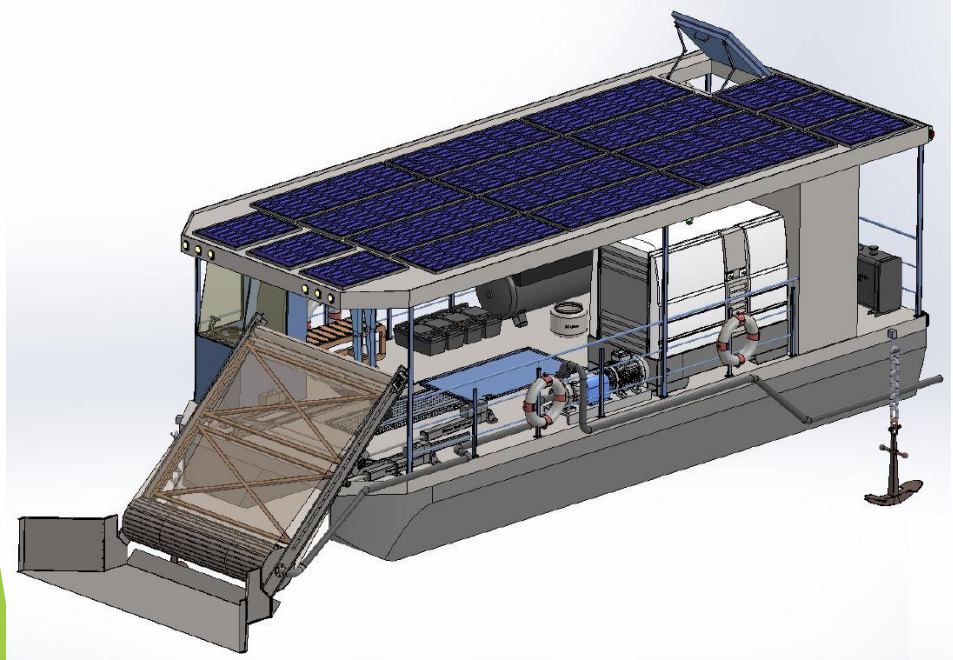
Research, engineering design, calculations and again research...(2018-2020)



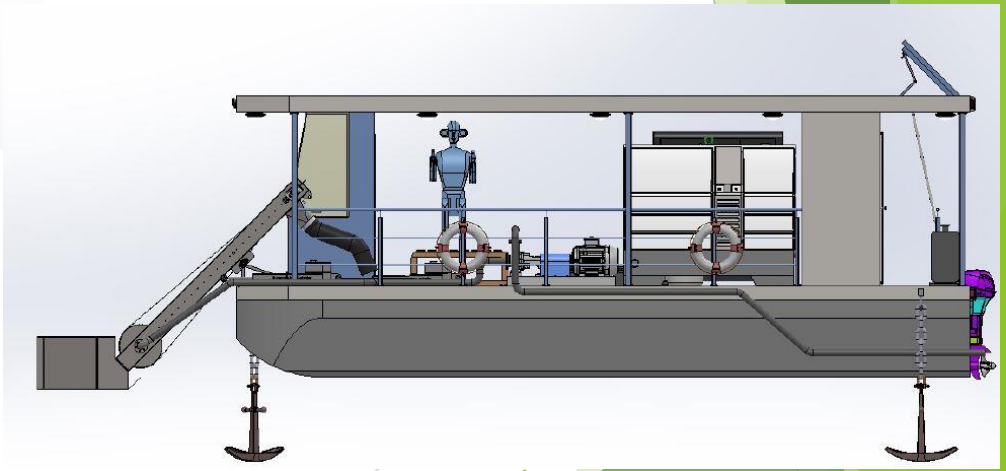
2nd version of AS-L



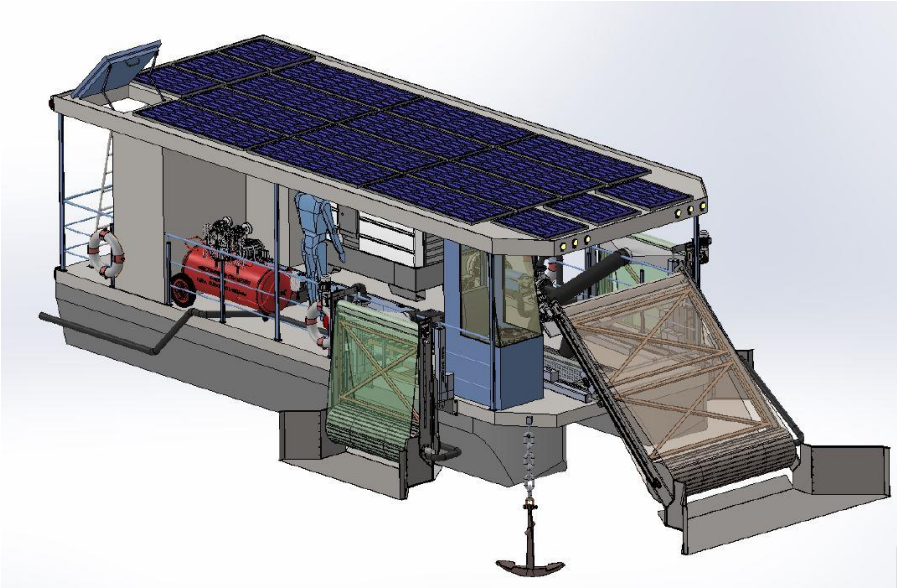
Research, engineering design, calculations and again research...(2018-2020)



3nd version of AS-L

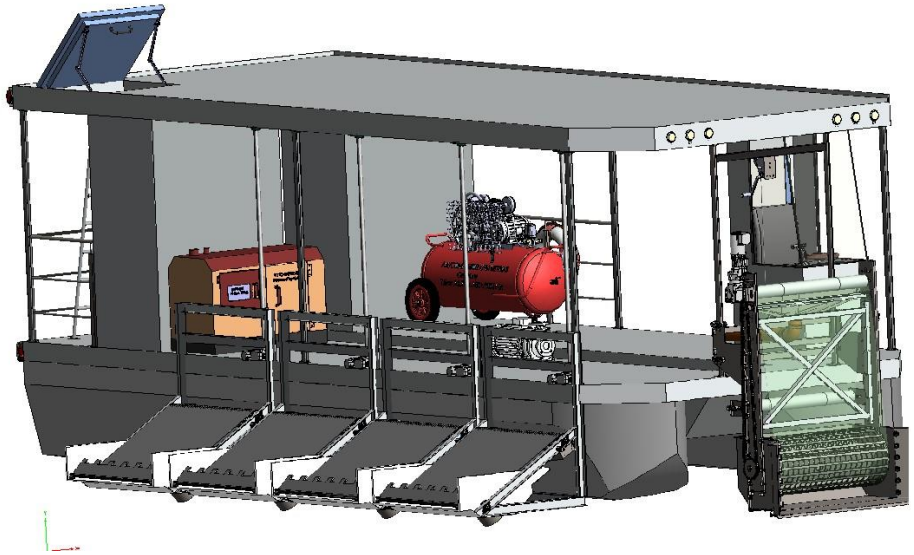


Research, engineering design, calculations and again research...(2018-2020)

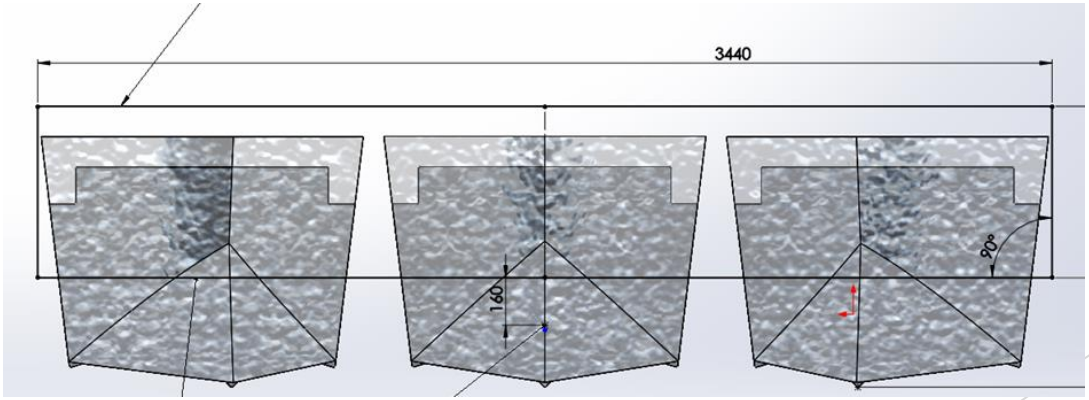


4th version of AS-L

Research, engineering design, calculations and again research...(2018-2020)



5th version of AS-L (final)

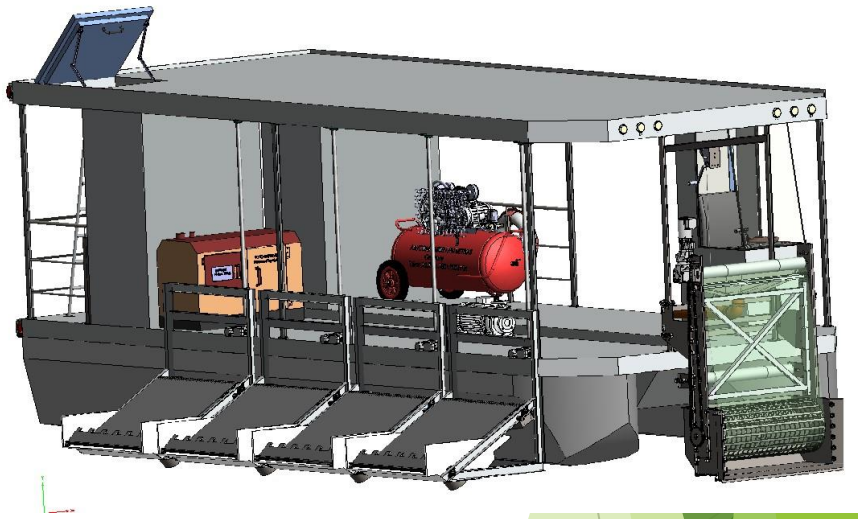


Catamaran to trimaran

AS-L manufacturing process

Technical information of AS-L

Technical information	Value
Platform length	8500 mm
Platform width	3440 mm
Height with pontoons	3250 mm
Pontoons height	1050 mm
Maximum draft	50 cm
Weight	3500 kg
Carrying capacity	4000 kg
Pontoons type	M+
Platform adapted to which category waves and wind strength	C-D[1]
Platform type	Trimaran
Number of pontoons	3

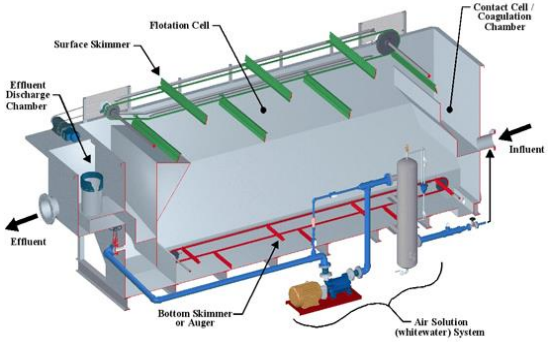


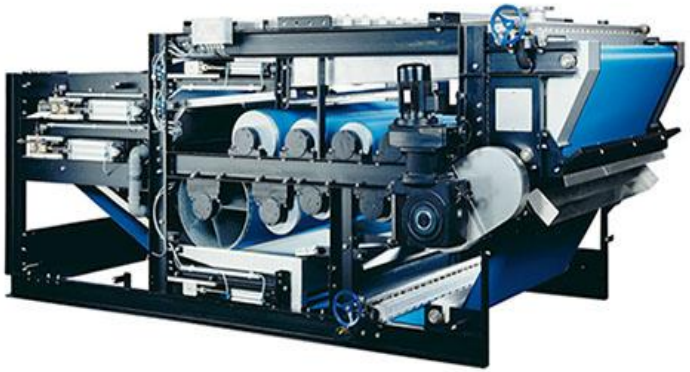
Before that...

Cyanobacteria collection technology research

Beggining of the project: there is NO simple technology to collect cyanobateria straight from ecosystem (waterbodies) in larger scale

Taking actions: review and analyzis of more than 12th different water treatment and algae separation technologies used worldwide that is MAYBE POSSIBLE to adapt to collect cyanobacteria from lakes. Result: NEGATIVE





State of Art technology research

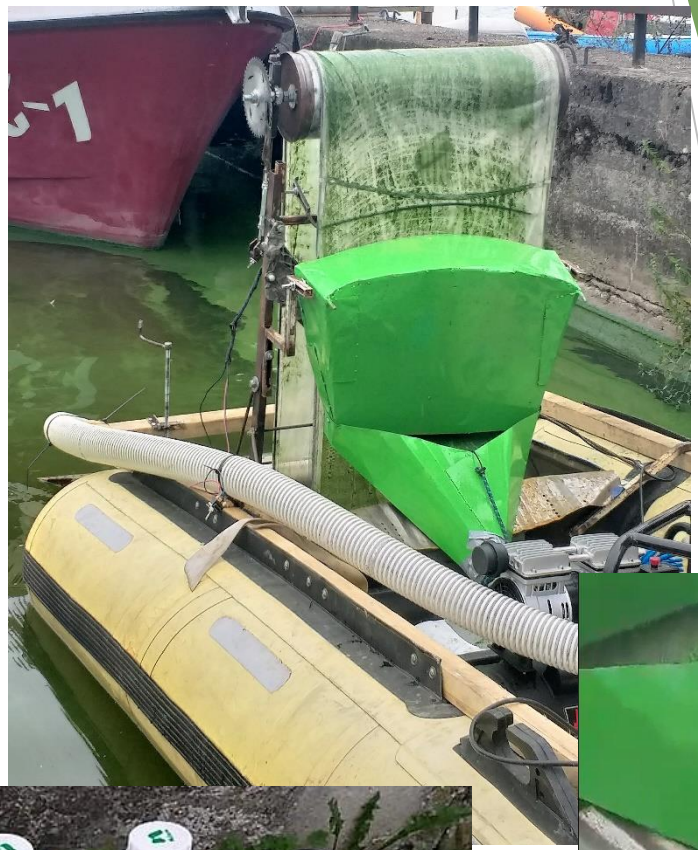
1) The suction hose is installed into a perforated cylinder at the bottom that holds filtration mesh. The filtration mechanism is lowered into the water

2) Microalgae collection begins. Slow water pumping is switched on, the water together with microalgae is pumped towards the filtration mesh. Microalgae do not pass through the filtration mesh, so it is sucked on filtration mesh and sticks to it.

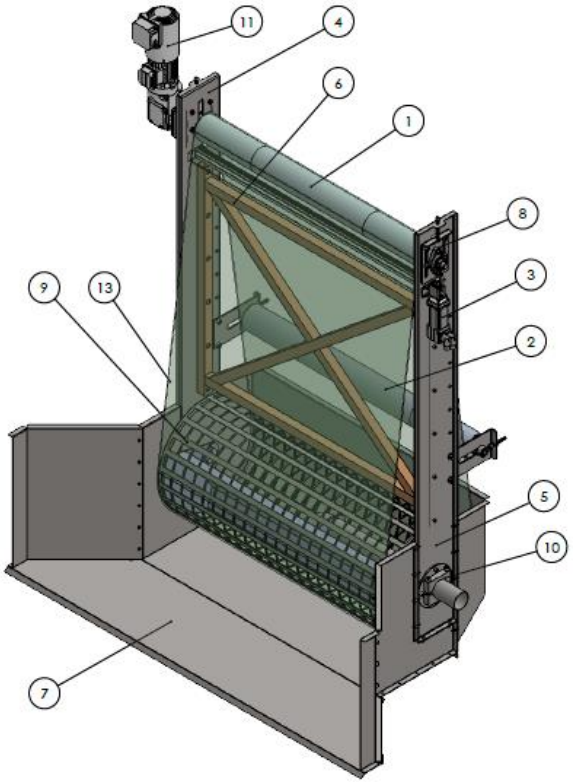
3) Then sucked microalgae is rotated to the spaying pint using perforated cylinders rotation. Meanwhile, the pumped water after passing through the filtration net is discharged through another water pump hose back into the water body

Test model made by project engineers to justify technology

More research, models and calculations



Microfiltration devices



1st version of filtration systems

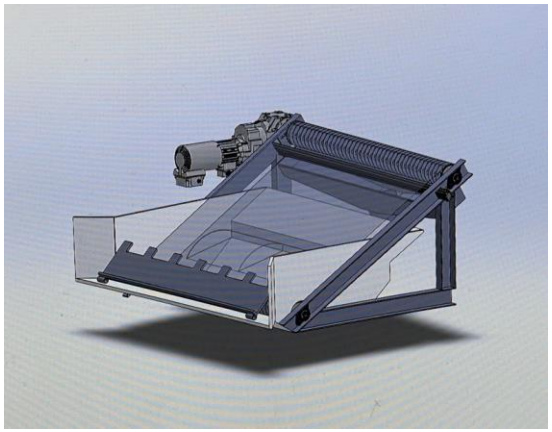
Collecting cyanobacteria (2021)

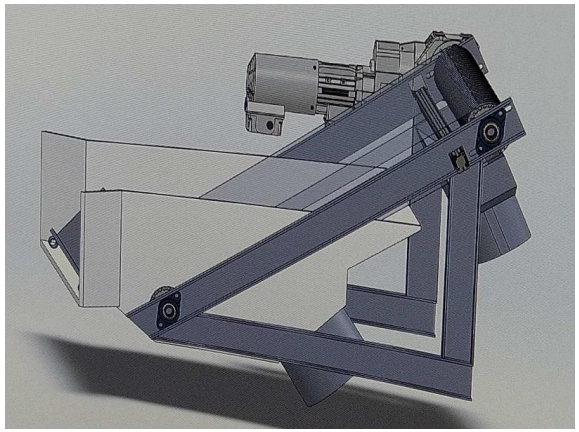
Technology explanaition:

Water with microalgae is drawn on a dense mesh (93, 103 or 144 microns depends on microalgae species) with water pumps, mesh with microalgae is lifted with electric system, then the compressed air blowns microalgae to the collection tank.

Problems identified with technology: equipment to heavy, angle of 90 degrees is not efficient, algae removal is not efficient

Microfiltration devices. Remodelling.





2nd version of microfiltration systems

Technical changes of microfiltration system: filtration equipment reduced by lengh, facilitated; total 6 meters of mesh (5 devices x 1,2 meters); algae collection will take place at an angle of 45 degrees; there will be an automatic equipment management system - network rotation and step, algae collection speed; the algae will enter the tanks that will be installed at the bottom of the ship.

AS-L prototype specifications

Eco-friendly parts:

- Biodiesel engine
- Solar panels, 12 psc
- Echo-sounder

Parts, which makes AS-L *State of art technology*:

- Trimaran type vehicle
- New invented technology for cyanobacteria collection
- 4 devices onboard by the side working at the same time or separate
- Possible to change mesh regarding cyanobacteria concentrations
- Full control pannel for microfiltration devices

Other basic parts:

- Pontoons
- Platform
- Control panel

AS-L working principle

AS-L harvester working principle

Cyanobacteria collection

Equipment used:

1. 4 devices by side, 1 in front
2. Dense mesh (53, 144 microns)
3. Water suction equipment under filtration mesh
4. Cyanobacteria lifting system
5. Pressed air nozzles for cyanobacteria removal from mesh
6. Drainage system
7. Microalgae collection system (tanks in the bottom of harvester)
8. Cyanobacteria collection automatization system

Permits received for AS-L

LIETUVOS TRANSPORTO SAUGOS ADMINISTRACIJA
LITHUANIAN TRANSPORT SAFETY ADMINISTRATION
VIDAUS VANDENŲ TRANSPORTO PRIEMONĖS
REGISTRACIJOS LIUDIJIMAS
CERTIFICATE OF INLAND WATERCRAFT REGISTRATION

2022-07-07
Klaipėda

Registro Nr. **LT-PI-767**
Laivo pavadinimas – **ALGAE SERVICE L**
Laivo tipas – **vandens telkinių valymo įrenginys**
Laivo paskirtis – **telkinių valymas nuo dumblių**
Laivo modelis – **b/p**
Unikalus identifikavimo kodas – **0000369532**
Statybos metai – **2022**
Kilmės šalis – **Lietuva**
Korpuso Nr. **BM061C021**
Korpuso medžiaga – **aliuminio lydinys**
Korpuso spalva – **pilka-balta**
Maksimalus ilgis – **11,20** m, plotis – **5,80** m

Maksimali grimzlė – **0,40** m
Minimalus viršvandenio borto aukštis – **1,20** m
Žmonių skaičius – **2**
Keliamoji galia – **4000,00** kg
Projektavimo kategorija –
Variklio tipas – **pakabinamas**
Variklio galingumas – **29,00** kW
Variklio modelis – **Mercury 40 ELPT CT, Nr. 1F41453GZ**
Variklio Nr. **1C648635**
Pagaminimo metai – **2020**
Savininkas:
Vardas, pavardė, asmens arba įmonės pavadinimas, kodas

UAB Baltic Environment
304169506

Adresas: **Vilnius, A. Juozapavičiaus g. 9-409**

JŪRŲ DEPARTAMENTAS
MARITIME DEPARTMENT

Jūrų departamento Laivybos paslaugų skyriaus
vyr. specialistė Ingrida Mileikienė

012976

2020 UAB „LODVILA" 01516-A1

Certificate of inland watercraft registration

Other created documents and received permits:

- AS-L building project
- Manufacturing AS-L registration certificate
- First technical inspection
- Annual technical inspection
- Prepared AS-L manual instructions
- Various requests and letters
- AS-L building supervision by Lithuania transport safety administration

Certificate of inland watercraft registration

2022-07-07

Klaipėda

Registration nr. LT-PI-767

Watercraft name: Algae Service L

Watercraft type: water bodies cleaning device

Watercraft purpose: water bodies cleaning from algae

Watercraft model: b/p

Unique identification number: 0000369532

Construction year: 2022

Origin country: Lithuania

Watercraft body number: BM061C021

Watercraft body material: aliuminum

Watercraft body colour: grey-white

Maximum lengh: 11,20 m, width- 5,8 m

Maximum grizzle- 0,40 m

Minimum freeboard height- 1,2 m

Passengers: 2

Carrying capacity: 4000 kg

Engine type- outboard motor

Engine power- 29 kW

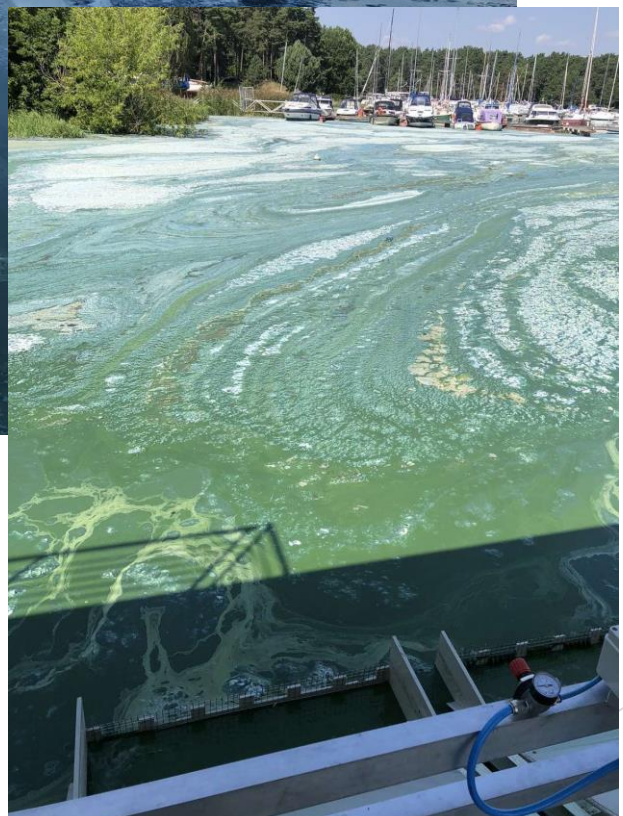
Engine model: mercury 40 ELPT CT, Nr. 1F41453 GZ

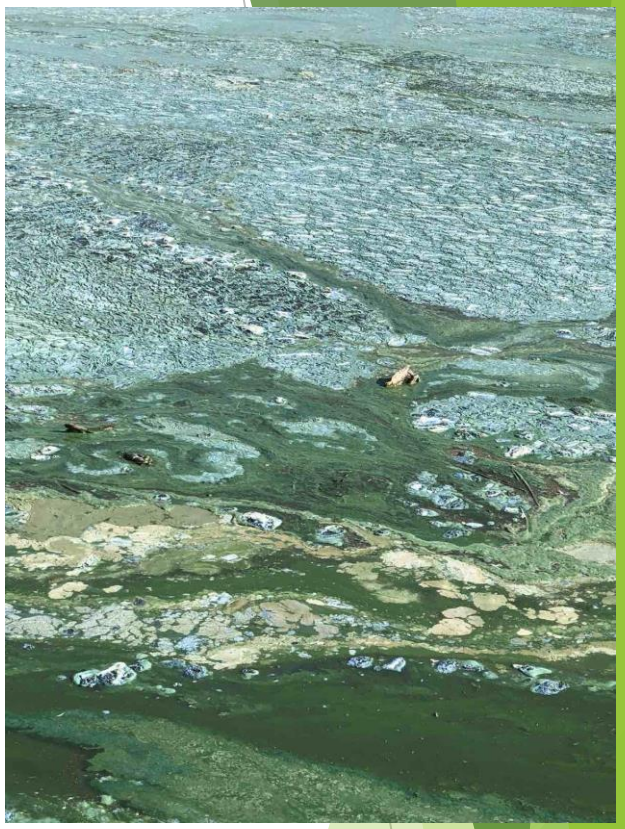
Engine Nr. 1C648635

Engine production year : 2020

Completed product AS-L

Kaunas lagoon 2022...



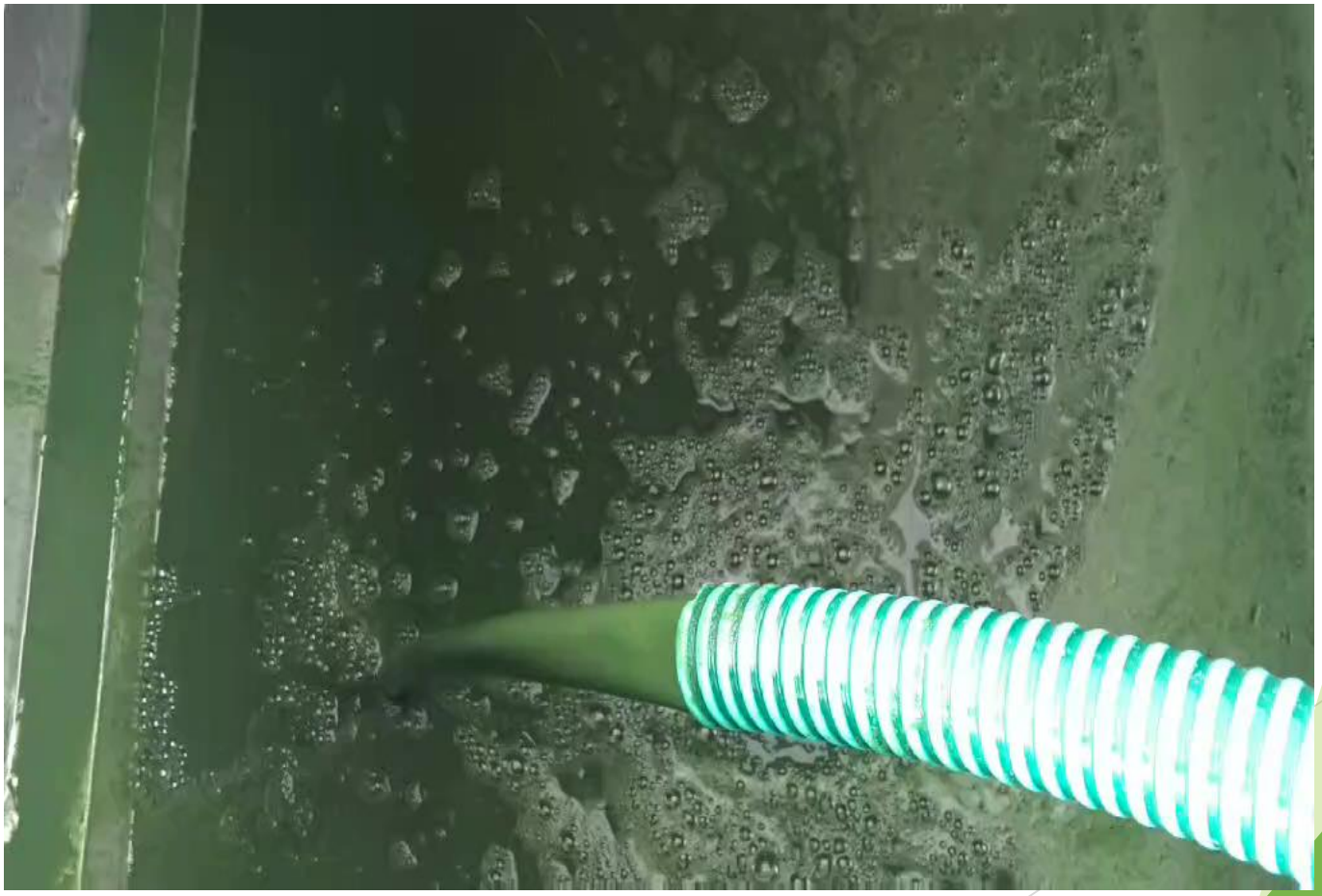


AS-L in use

Harvesting capacity: in 2 weeks in Kaunas lagoon total up to 5000 litres wet biomass collected, per day record 600 litres

AS-L collects up to 120 litres per hour (depends on concentration), up to 850 litres per day

Video of cyanobacteria in Kaunas Lagoon collection



Collected biomass concentration differences

AS-L creative group:

Managers: L. Drazdienė, J. Drazdas

Lead engineer: B. Rutkauskas

Co-engineers: L. Chotkevičius, K. Vitkutė, A. Zagorskis, A. Inčiūra, K. Inčiūra, L. Lesčius, A. Zažeckas, V. Lucik

Thank you for your attention

Before AS-L Kaunas laggon shore

After AS-L cyanobacteria collection