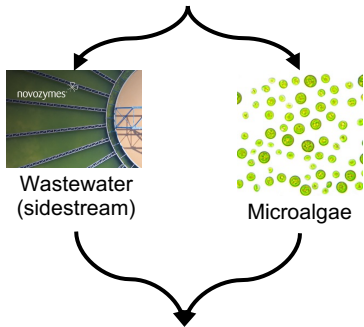


## Introduction

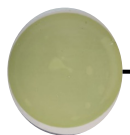
### Bioremediation



Efficient removal of contaminants: COD, phosphorus and nitrogen

### Objective:

- Implement the Box-Behnken design experiment to optimize the cultivation process of *Chlorella vulgaris* with the aim of reducing the Chemical Oxygen Demand, nitrogen, and phosphorus concentrations in the sidestream and validate the results employing a function-fitting neural network model.

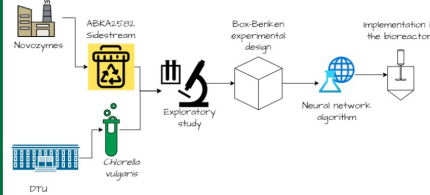


Biomass

High value compounds for food applications

## Methods

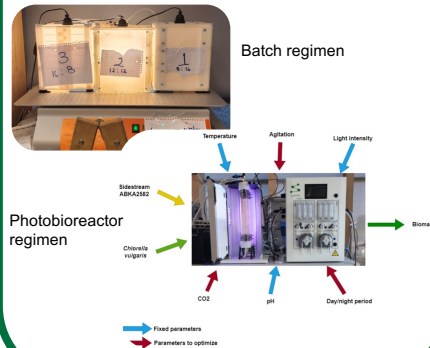
### General methodology:



### Box-Behnken model:

Experiment	CO <sub>2</sub> (V/V)	Agitation (RPM)	Day/night cycle (hrs)
1	0.5	150	8:16
2	1.5	150	8:16
3	0.5	150	16:8
4	1.5	150	16:8
5	1	150	12:12
6	1	150	12:12
7	1	150	12:12
8	1	100	8:16
9	1	100	16:8
10	0.5	100	12:12
11	1.5	100	12:12
12	1	50	08:16
13	1	50	16:08
14	0.5	50	12:12
15	1.5	50	12:12

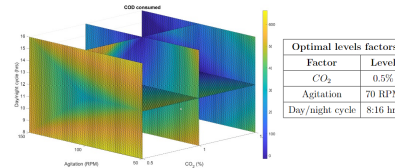
### Implementation the optimization process in batch and semicontinuous regimen.



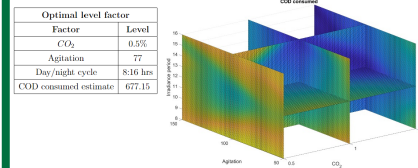
## Outcome

### Results:

#### Box-Behnken model



#### Function-fitting neural network model



#### Implementation in photobioreactor



NANO SALT photobioreactor  
Box-Behnken model



CC photobioreactor  
Function-Fitting ANN

#### COD-Biomass ratio

Measuring	Batch Sample 1	NANO SALT photobioreactor	CC photobioreactor
Dry Biomass	0.2 g/L	0.3 g/L	0.4 g/L
COD	0.981 g/L	0.624 g/L	0.702 g/L
Ratio	0.203	0.480	0.569

## Perspectives

### Future research:

- Transfer the optimization in continuous regimen.
- Acquire the high value compounds for food applications.
- Water quality.

### Opportunities to be Helix-Lab fellow:

- Collaboration of academia and industry of Denmark.
- Learn more about Denmark culture.
- Increase the chances to participate in PhD. program in DTU

### Future ambitions:

- Participate in PhD. Program
- Investigate more about wastewater, photobioreactor design and instrumentation.