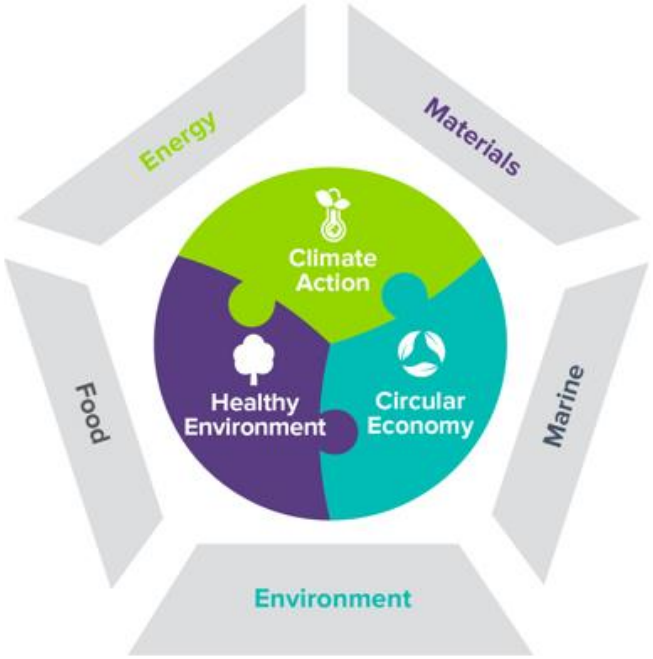
Environmental Research Institute

Postgraduate Research Symposium

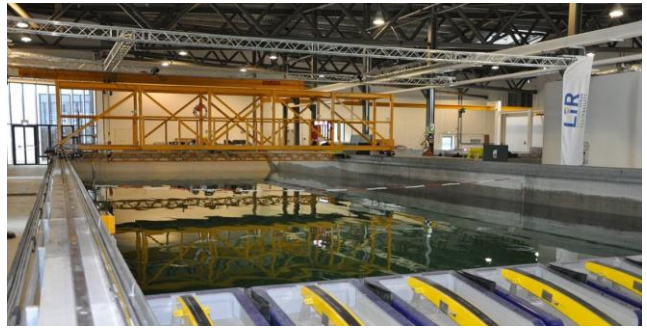
25th Nov | 9am-1pm | Dora Allman Room | Student Hub, Main Campus



Environmental Research Institute

Brings together **470 researchers** (100 affiliated academic staff) from **25 Schools** and **6 research centres** across science, engineering, business, law and humanities to address the core challenges of climate action, circular economy and healthy environment.

7000 m^2 of research space.



474
Researchers
(88 Academics)

274
Live Projects

1627
Publications*

7000
m^2 of dedicated research space

231
Postgraduates Graduated

€77.5m
Research Income*

*2017-2021

Centre for Research into Atmospheric Chemistry

SFI MaREI Centre for Energy, Climate & the Marine

UN GEMS Water Capacity Development Centre

Centre for Law & the Environment

Cleaner Production Promotion Unit

Aquaculture & Fisheries Development Centre

How we work

“The complexity of global sustainability challenge requires experts from multiple disciplines & sectors to collaborate together to successfully develop usable knowledge & robust solutions.

A community of scholars working together to produce usable knowledge...

...to solve key sustainability challenges...

...in strong partnerships with external stakeholders.

What we hope to do today

- Opportunity for you to learn about the breadth of research activity and expertise within the ERI
- Connect with and meet new colleagues
- Showcase your project and expertise
- Think about how ERI might support you in your current PhD studies

Programme

09:00	Gathering with tea and coffee	Open
09:30	Welcome address from Prof Sarah Culloty (ERI Director and Head of the College of SEFS)	Open
09:45	Flash presentation session 1 **(see schedule on next page)**	Open
10:45	**Breakout Session 1:** Icebreaker	**PG students only**
11:15	Tea & Coffee break	Open
11:30	Flash presentation session 2 **(see schedule on next page)**	Open
12:30	**Breakout Session 2:** Creating research leadership for sustainable society	**PG students only**
13:20	Closing remarks from Prof Jerry Murphy (Deputy Director of the ERI, Director of the SFI MaREI Centre for Energy, Climate and Marine)	Open
13:30	Lunch	Open

Flash Presentation Session 1

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

MaREI
Energy · Climate · Marine

Environmental Research Institute

Circular Economy, Energy & Environmental Systems

ERI Postgraduate Research Symposium

25th November, 2022

Rajas Shinde

Name: Rajas Shinde

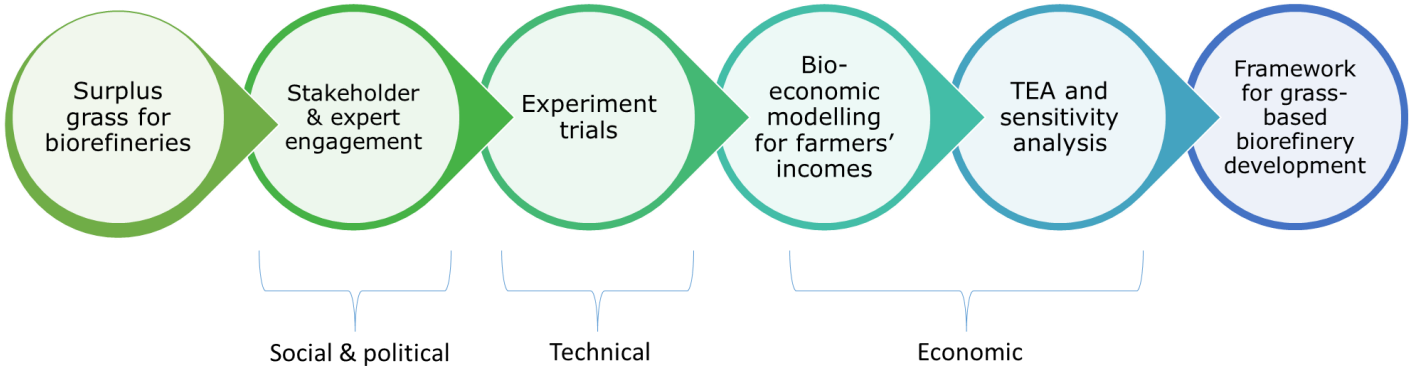
Research group: Circular Economy Energy & Environment Systems (CEEES) - Led by Prof. Jerry Murphy

When I am not researching: Out in the nature – cycling or hiking

Expanding the alternative use and circularity potential of crops (EXPECT)

Goal*:*

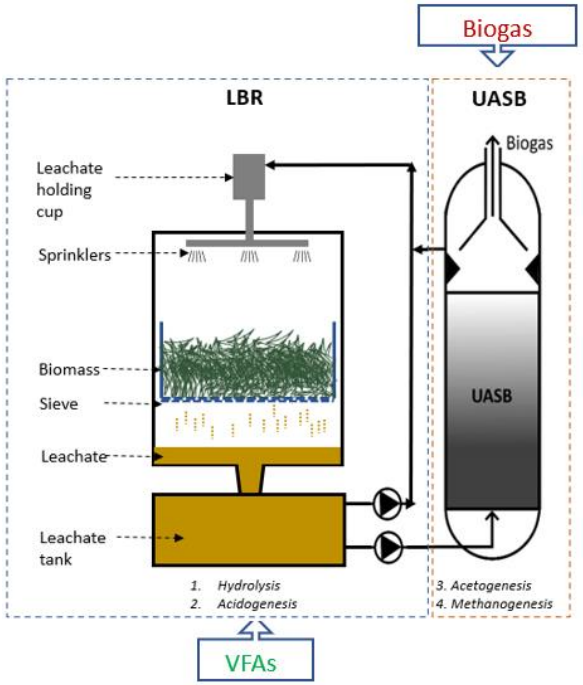
To co-design a framework for development of grass-based biorefining in Ireland



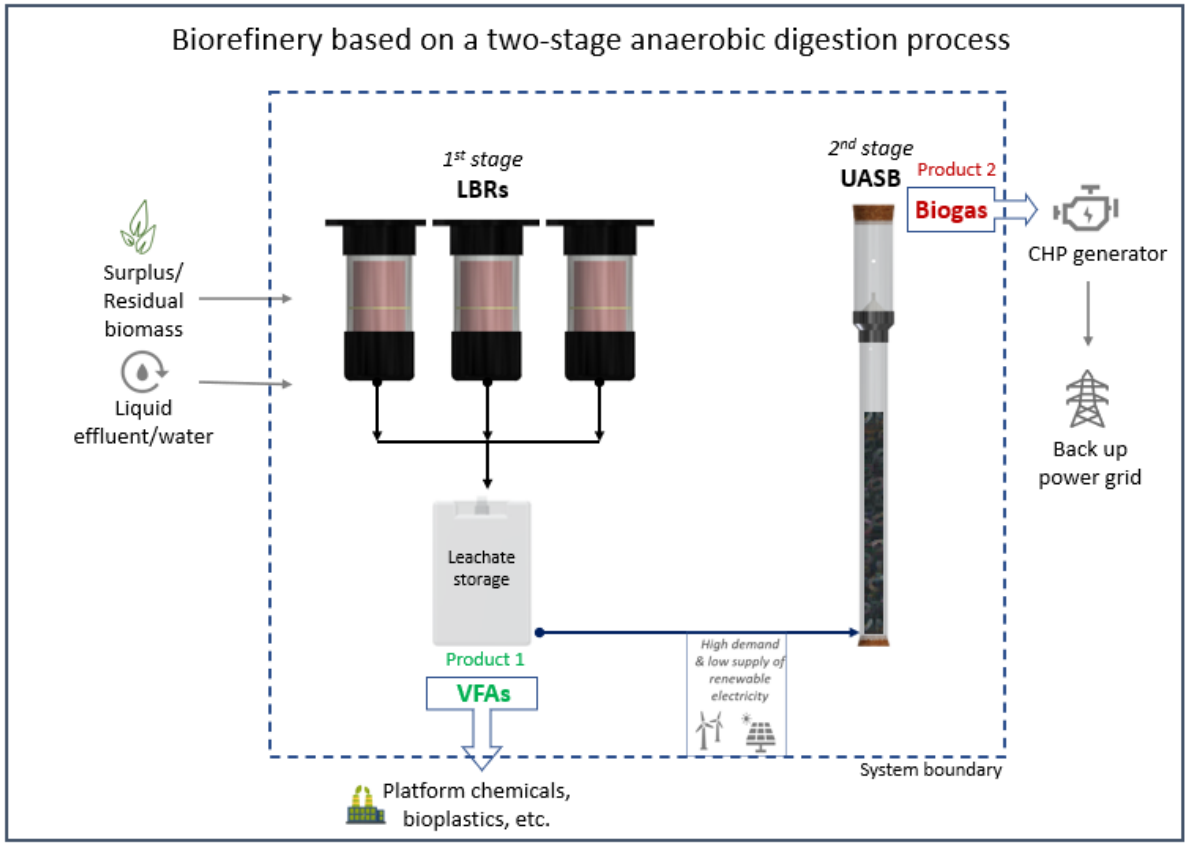
Expanding the alternative use and circularity potential of crops (EXPECT)

Develop a reactor technology suitable for grass-based biorefineries

- Two stage Anaerobic Digestion



Expanding the alternative use and circularity potential of crops (EXPECT)



Legend	
LBR	Leach Bed Reactor
UASB	Upflow Anaerobic Sludge Blanket
CHP	Combined Heat Power
VFA	Volatile Fatty Acids

Expertise and Skills that I can offer

- Valorisation of organic waste streams
- Biobased circular economy
- Renewable energy

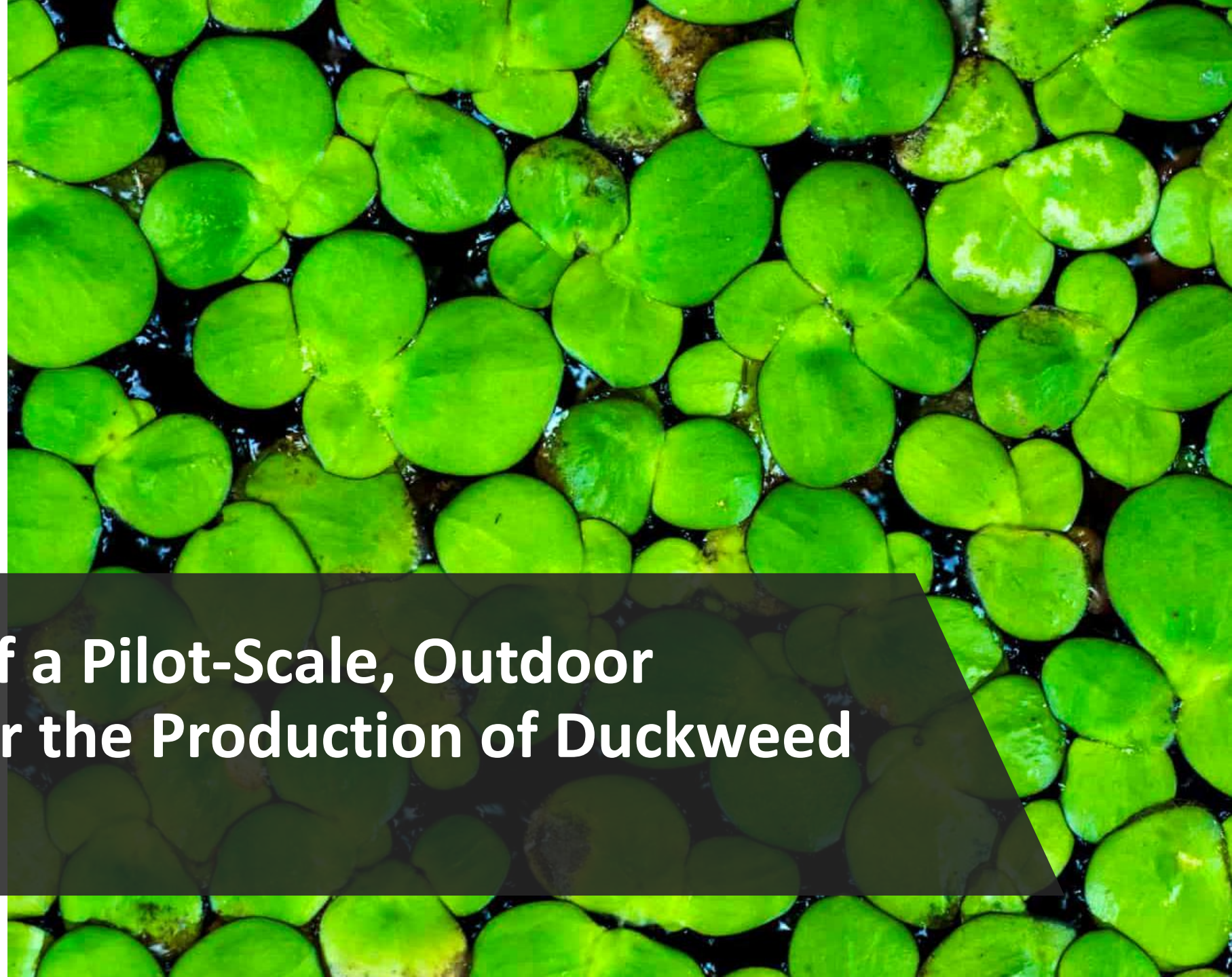
Expertise and Skills that would be helpful for my project

- Microbiology
- Resource mapping – GIS/RS
- Modelling
- Social science technique – Delphi study

THANK YOU

Duck-Feed

Sustainable protein from duckweed



The Design of a Pilot-Scale, Outdoor Bioreactor for the Production of Duckweed

By Grace O’ Sullivan

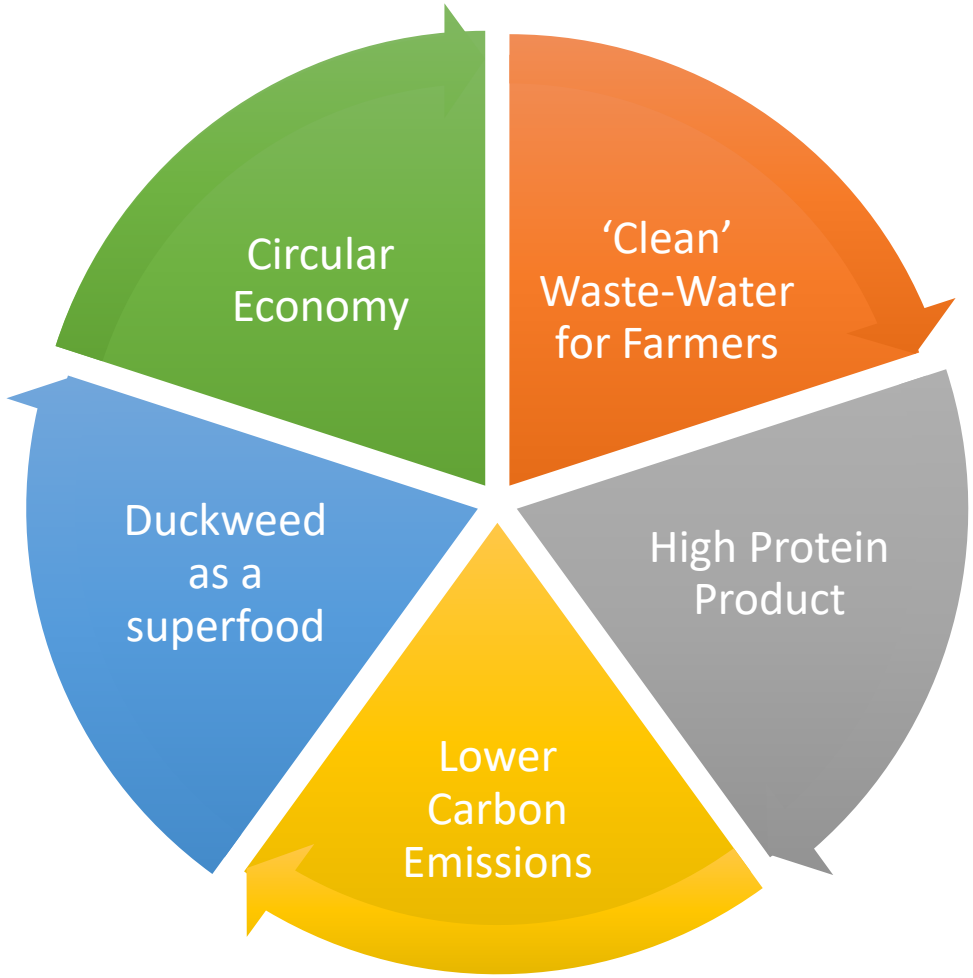
Introduction

My Background
- BSc (Hons) Biotechnology
- Started MEngSc on October 3rd

Research Group
- DuckFeed Project: Collaboration between UCC, Teagasc, DAFM and Devenish
- P.I. : Marcel Jansen
- Supervisors: Ed Byrne and Fatemeh Kavousi (Process and Chemical Engineering)

Outside of Researching? Second-Hand Shopping, Film Photography, Gigs

What is your research project about & why is it important?



My Role

- Design of a robust, outdoor system
- Target Consumer-Farmers
- Easy to acquire and use
- Currently-Cascading System VS Raceway

(Devlamynck, de Souza, Leenknegt, et al., 2021)

(Stejskal, Paolacci, Toner, & Jansen, 2022)

Expertise and Skills that I can offer

- Background in Biotechnology
- Experience in the Biopharmaceutical Industry
- I.T. skills- work with Student I.T.

Expertise and Skills that would be helpful for my project

- Background in engineering
- Experience in computational fluid dynamics

Thanks for listening ☺

Duck-Feed

Sustainable protein from duckweed

References

- Devlamynck, R., de Souza, M. F., Leenknegt, J., Jacxsens, L., Eeckhout, M., & Meers, E. (2021). Lemna minor Cultivation for Treating Swine Manure and Providing Micronutrients for Animal Feed. *Plants, 10*(6). doi:10.3390/plants10061124
- Stejskal, V., Paolacci, S., Toner, D., & Jansen, M. A. K. (2022). A novel multitrophic concept for the cultivation of fish and duckweed: A technical note. *Journal of Cleaner Production, 366*, 132881. doi:https://doi.org/10.1016/j.jclepro.2022.132881

Tell us about yourself!

Larissa Macedo Cruz de Oliveira (de Oliveira L.M.C)

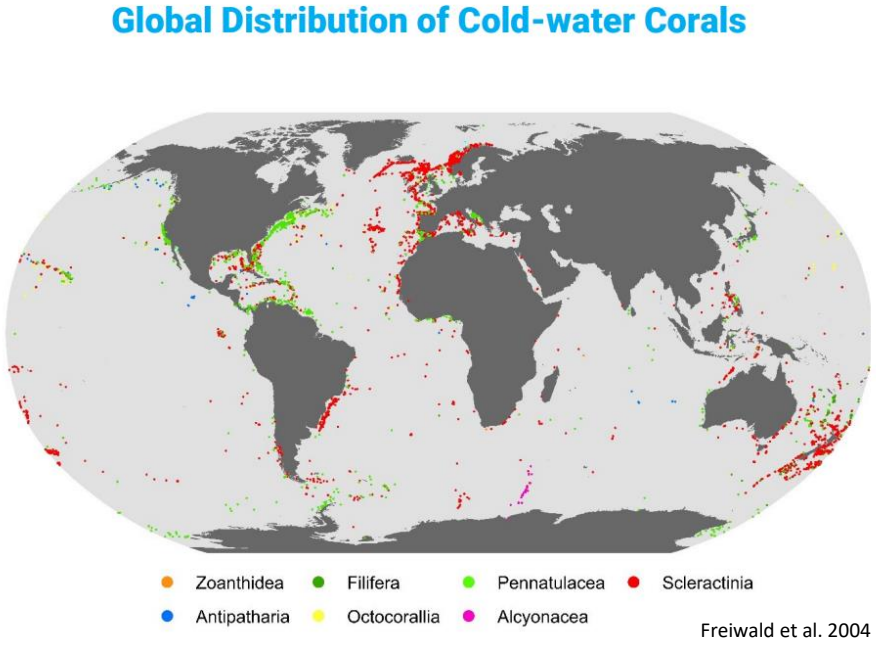
Marine Geosciences Research Group
University College Cork

IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn

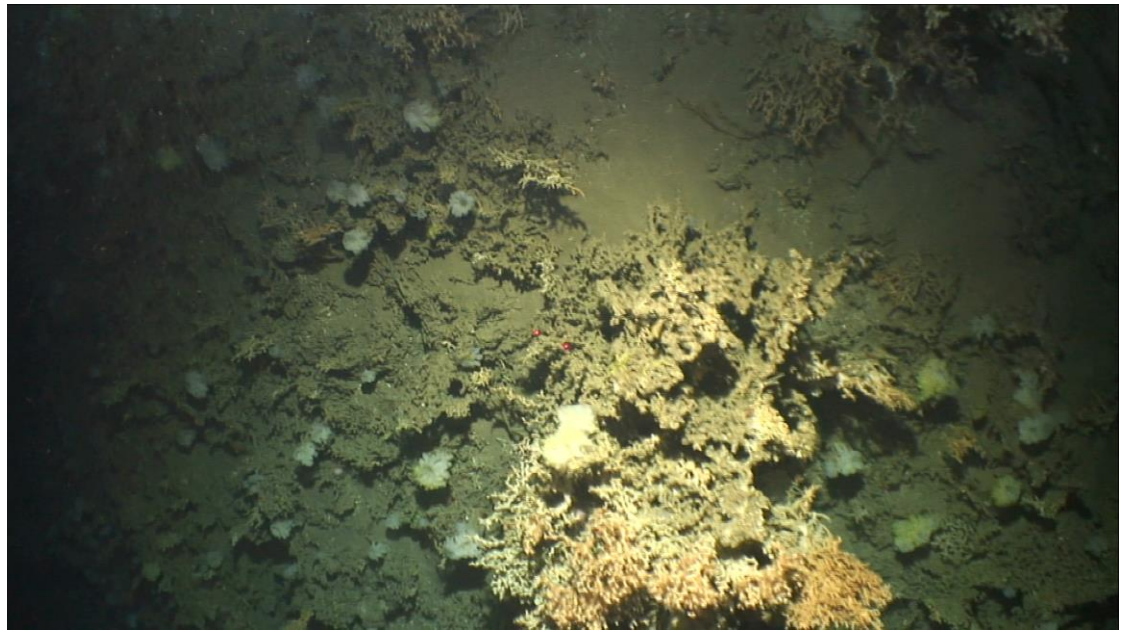
Hobbies….

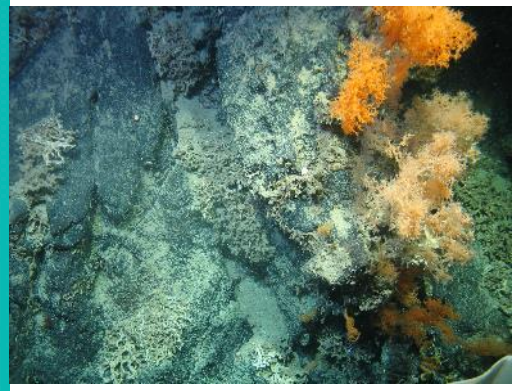
larissa.oliveira@ucc.ie

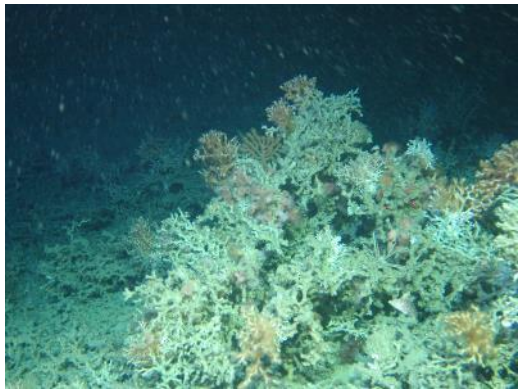
What is your research project about & why is it important?



Freiwald et al. 2004

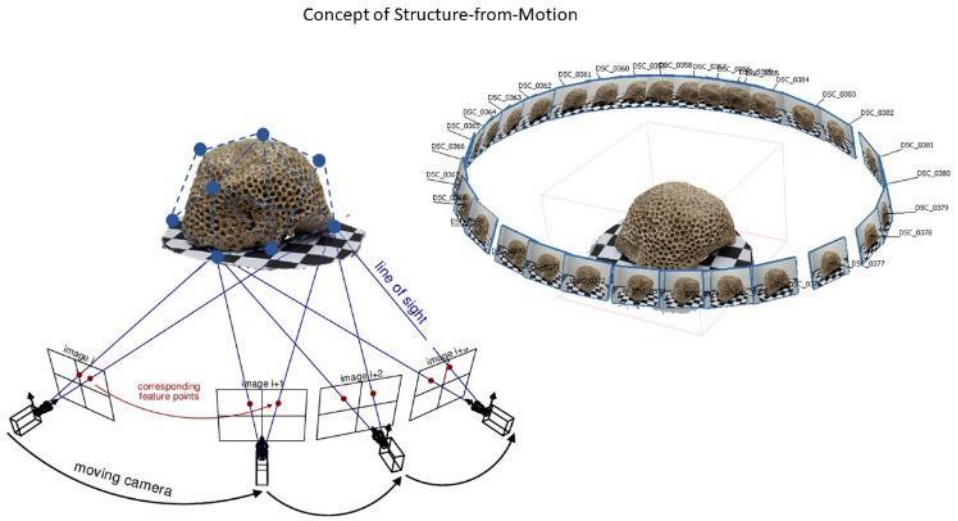


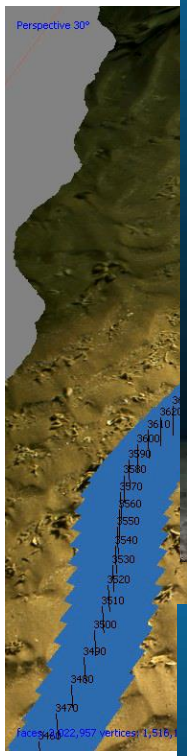




larissa.oliveira@ucc.ie

Expertise and Skills that I can offer





Metashape

scikit learn

CloudCompare
3D point cloud and mesh processing software
Open Source Project

Expertise and Skills that would be helpful for my project

ResearchGate

larissa.oliveira@ucc.ie

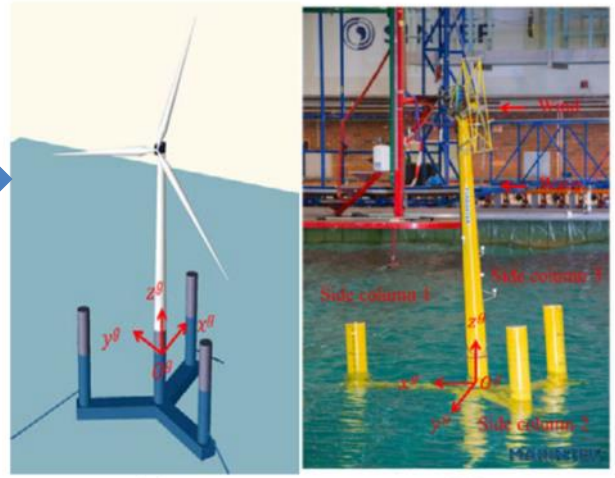
Innovative testing and analysis of load characteristics of floating ORE Technologies

Agro Wisudawan

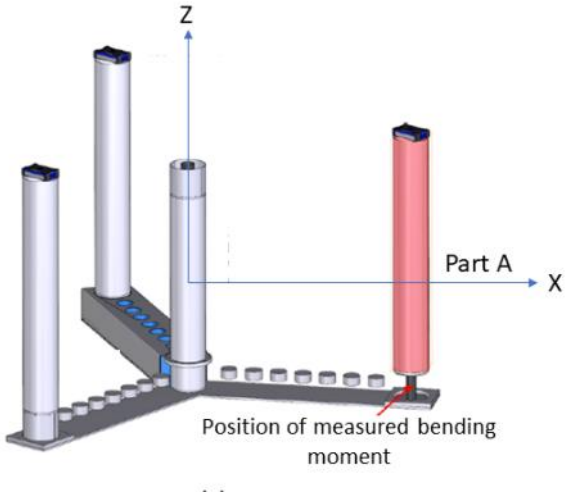
Supervisors:
Dr. Jimmy Murphy
Dr. Vesna Jaksic
Dr. Vikram Pakrashi

Object of study

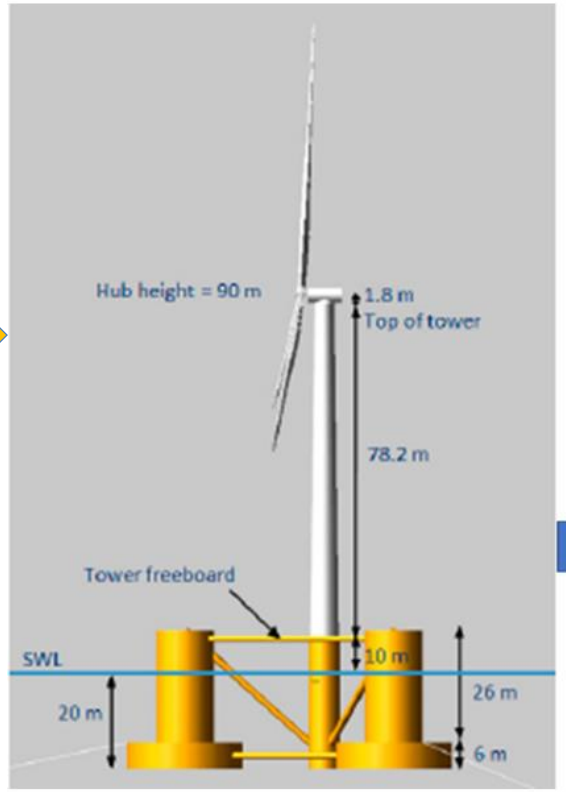
Ponton based floater



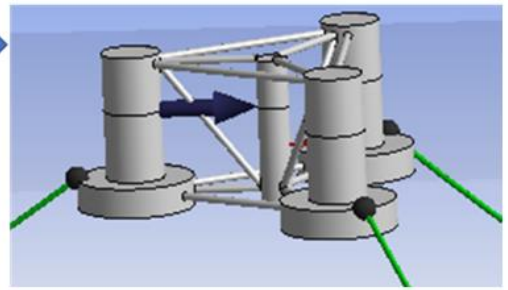
Braceless Semisubmersible
Luan, et.al, 2017



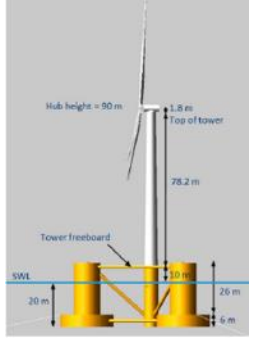
Bracing based floater

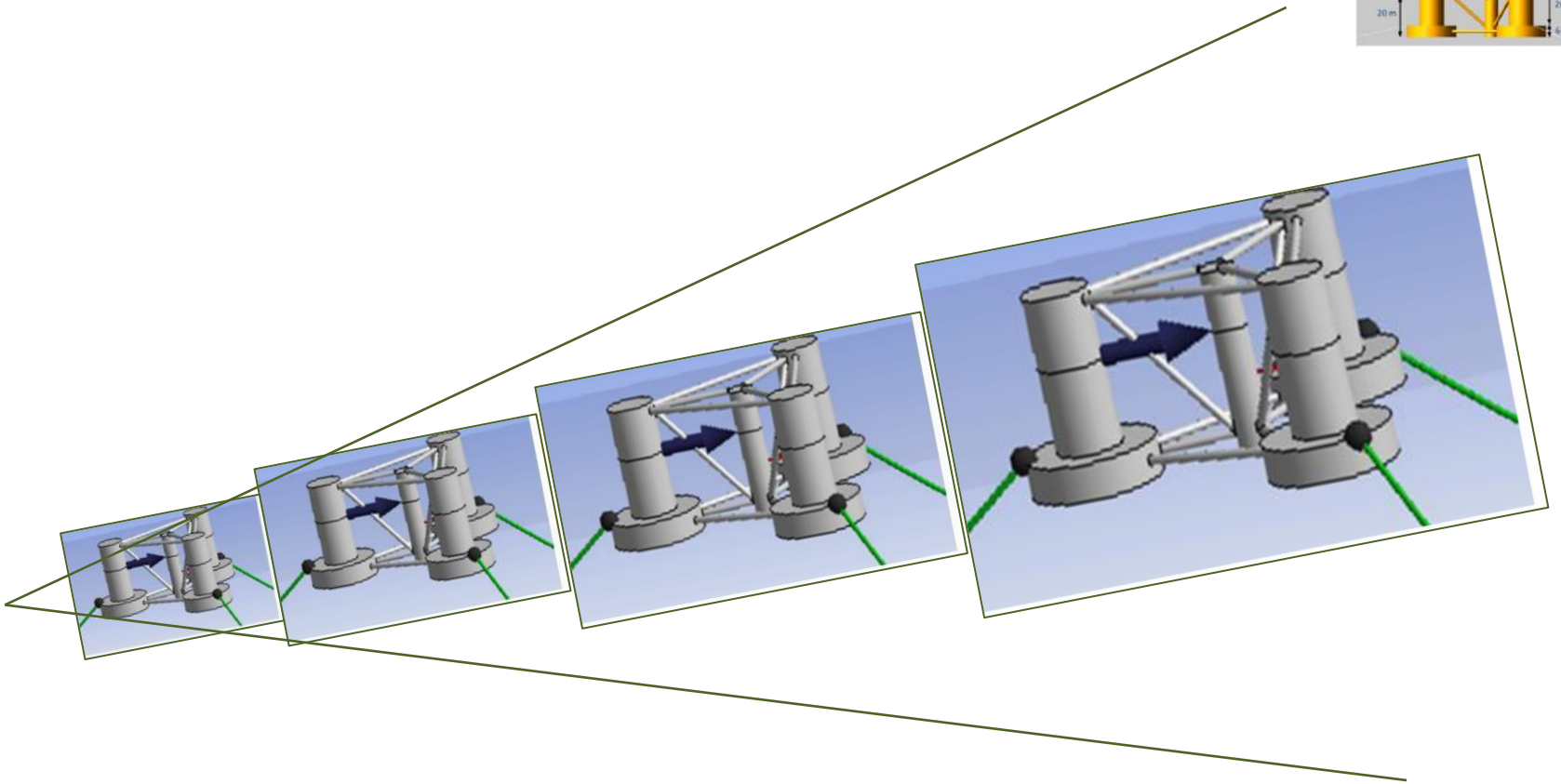


DeeCwind Semisubmersible
Robertson, et.al, 2014



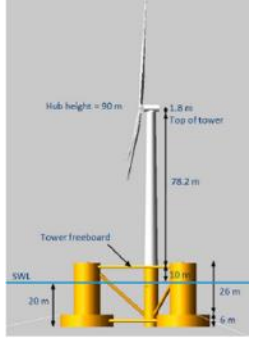
Research focus: Bracing based floater (DeepCwind Semisub) …..

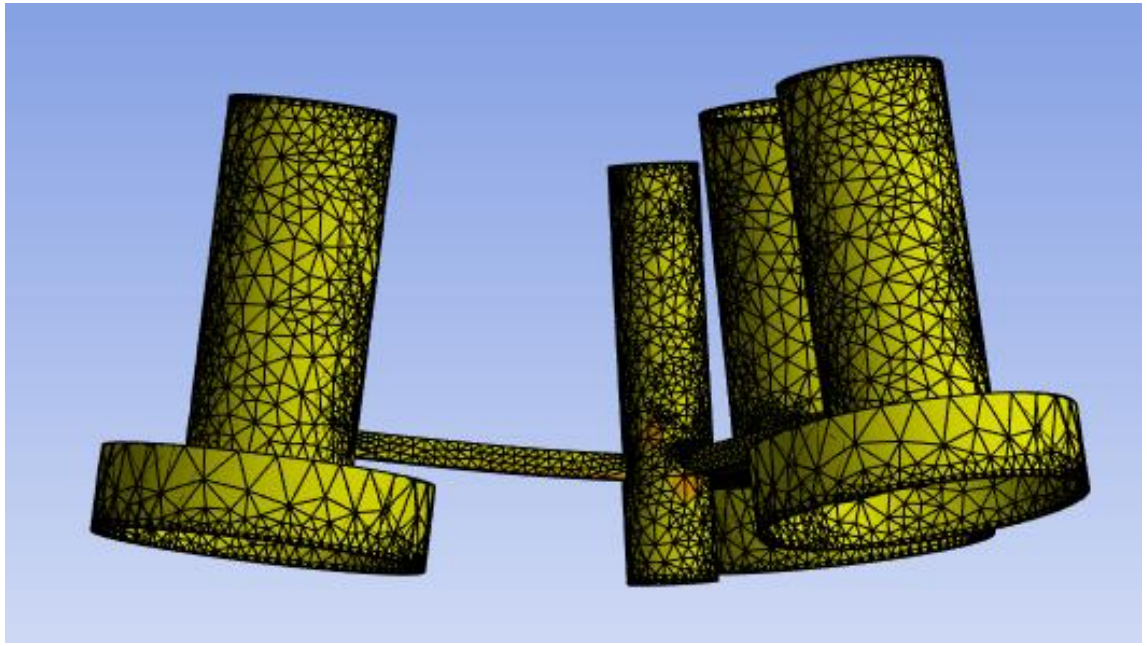




1. Scaling up consistency check (numeric)

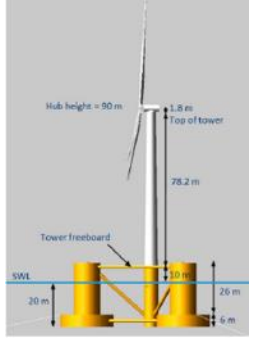
Research focus: Bracing based floater (DeepCwind Semisub)……

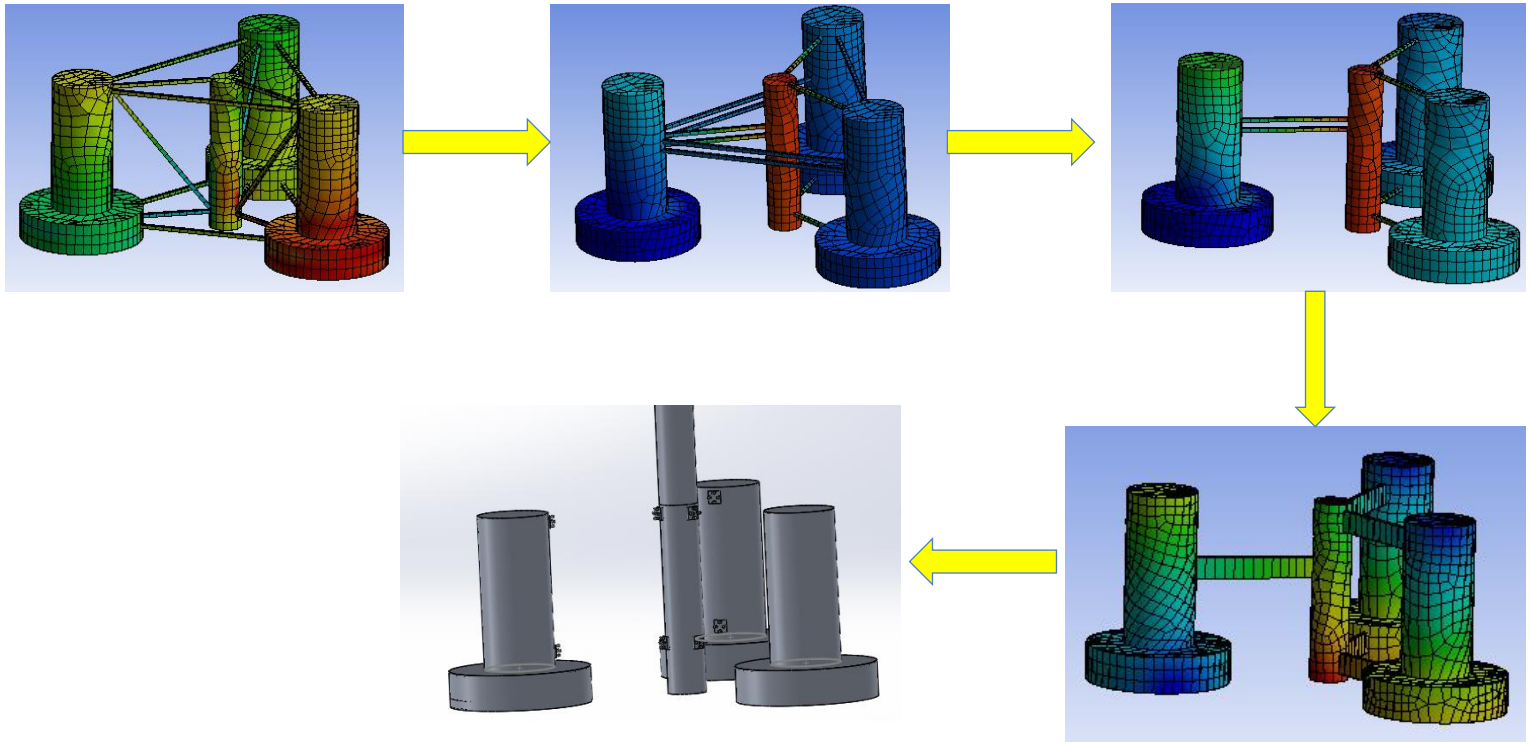




2. Numerical analysis of internal bending moment

Research focus: Bracing based floater (DeepCwind Semisub)……





3. Model evolution to obtain the optimized model for laboratory testing in Bending moment

Sound interesting ?

Just contact:

Agro.Wisudawan@ucc.ie

Thanks !!

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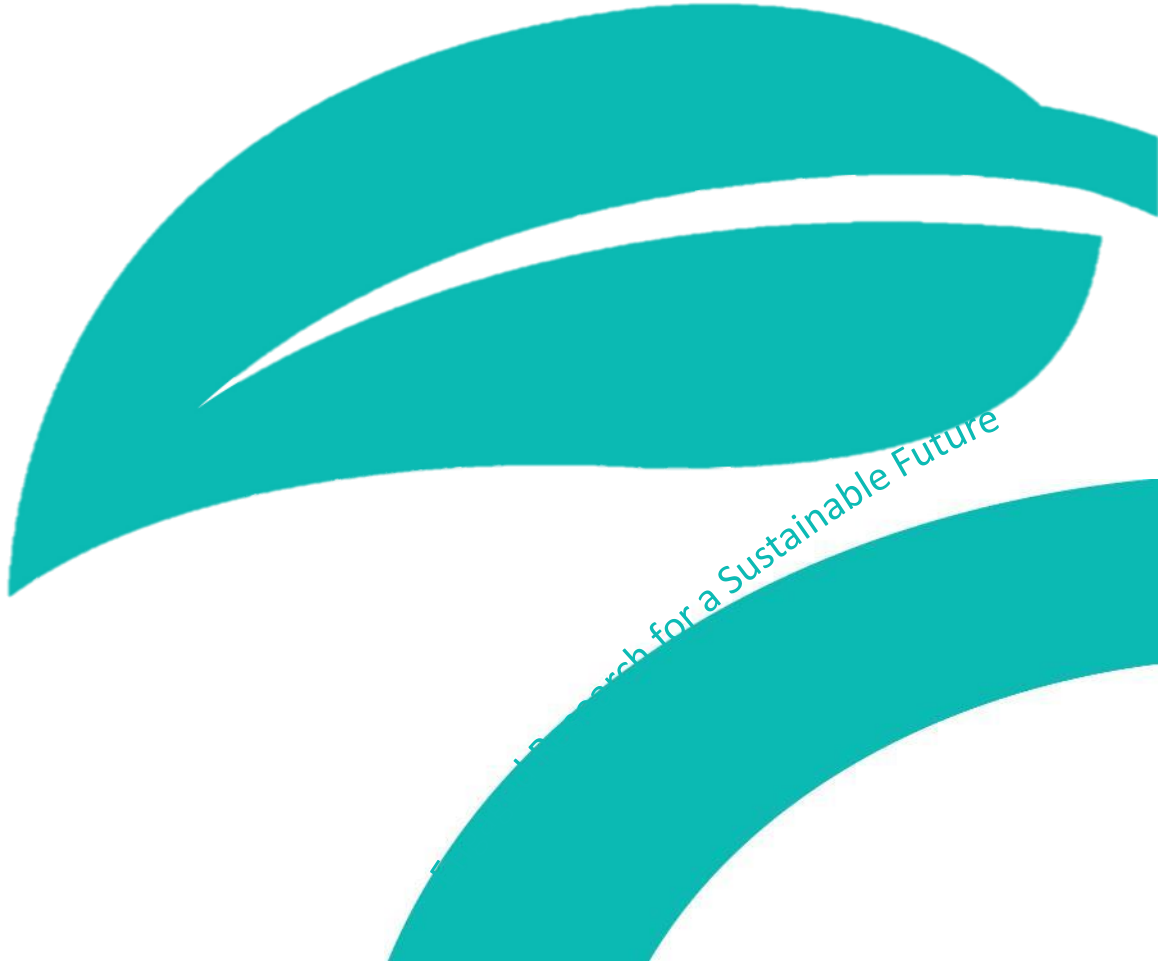
MaREI
Energy · Climate · Marine

Environmental Research Institute

Postgraduate Research Symposium

Emma Condon



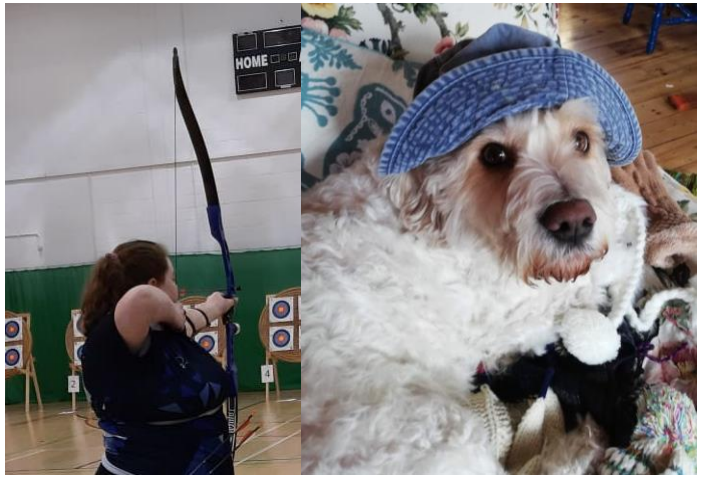
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

About me;

Research Team

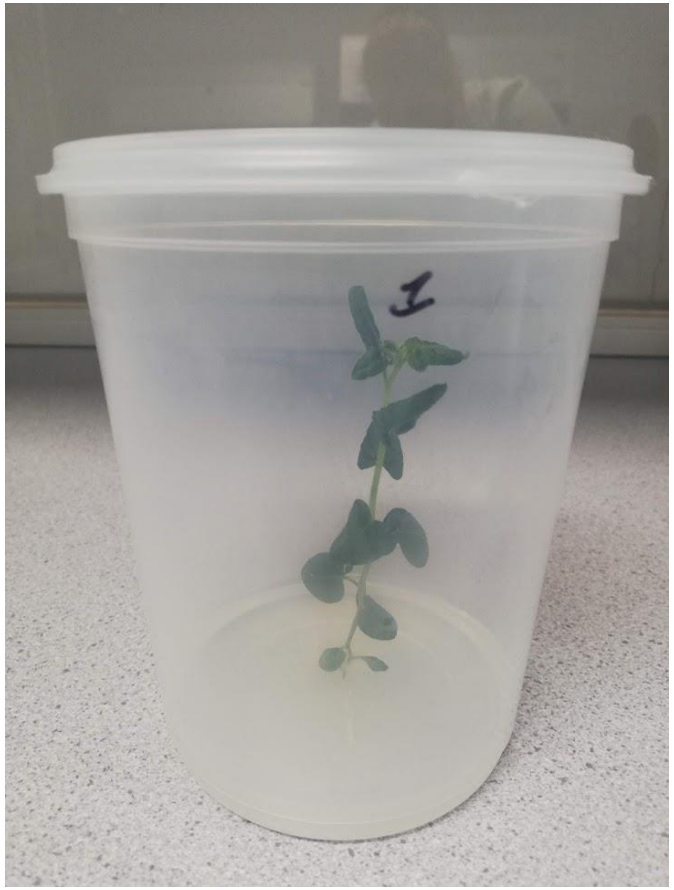
Dr. Indu Muraleendharan Nair
Dr. Barbara Doyle-Prestwich
Emma Condon
Dr. John Mackrill

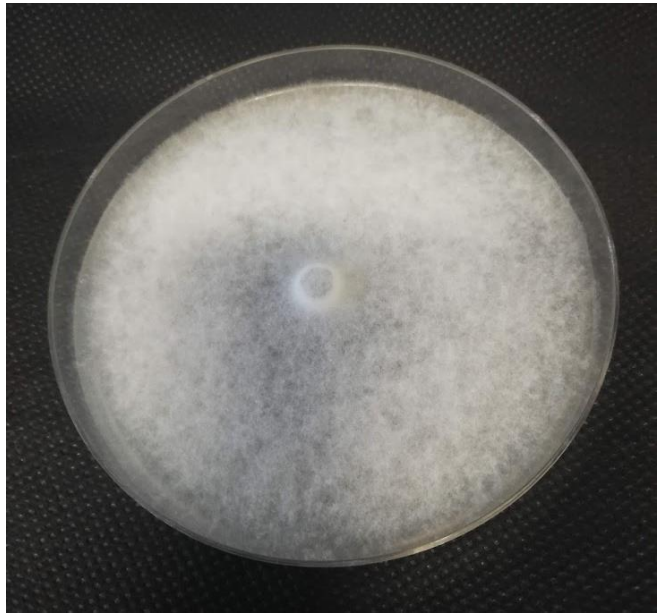
Hobbies



Fondúireacht Eolaíochta Éireann
Dá bhfuil romhainn
Science Foundation Ireland
For what's next

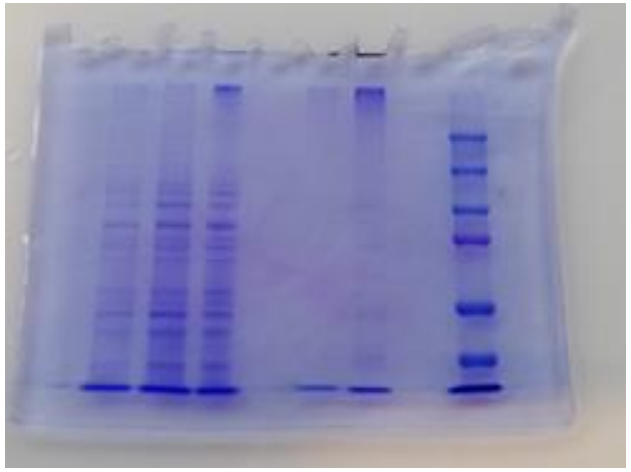
Phytophthora Infestans

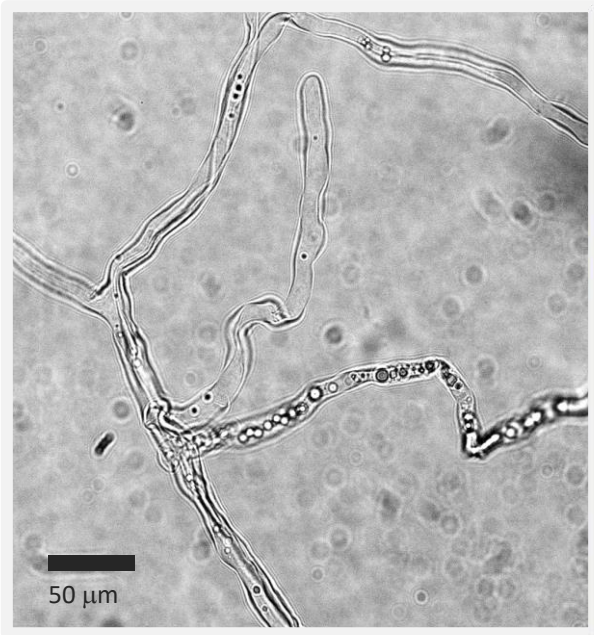


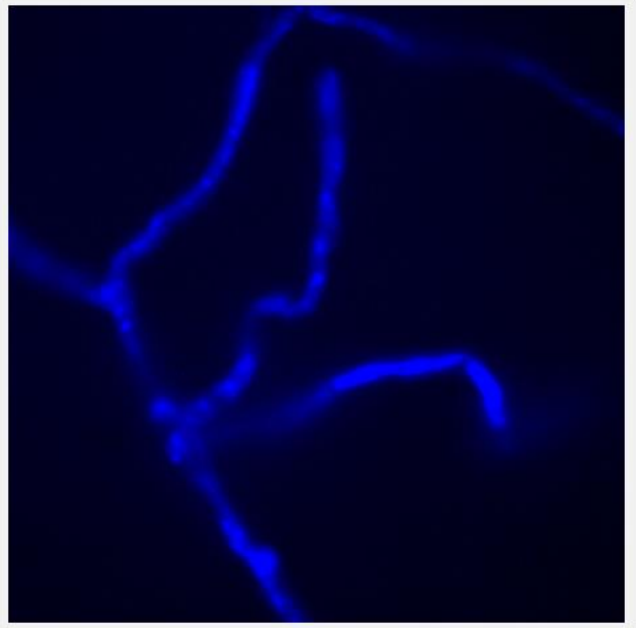


Calcium signalling mechanisms

- Inositol trisphosphates (IP3) are key signalling molecules in the calcium signalling pathways.
- *P. infestans* appears to be lacking key molecules involved.
- Understanding these underlying mechanisms could allow for targeted treatments of *P. infestans* infection.







Emma O'Sullivan-Carroll

- 3rd Year Analytical Chemistry PhD Student

- Sensing & Separation Group – School of Chemistry

- Industry-funded PhD
  - Hovione Ltd: Contract development and manufacturing company that is dedicated to helping pharmaceutical customers bring and off-patent drugs to market.

- Hobbies: Reading and drinking coffee

My Research

- *"Raw sewage and wastewater effluents are a major source of pharmaceuticals found in surface waters and drinking-water".*
- *"Wastewater and drinking-water treatment processes are not designed specifically to remove pharmaceuticals".*
- *"Routine monitoring programmes to test drinking-water for pharmaceuticals have not been implemented".*

- World Health Organization, "Pharmaceuticals In Drinking Water", 2012.

ELSEVIER

Water Research

Volume 126, 1 December 2017, Pages 79-87

Negative environmental impacts of antibiotic-contaminated effluents from pharmaceutical industries

Ana Bielen [a, 1], Ana Šimatović [b, 1], Josipa Kosić-Vukšić [c], Ivan Senta [b], Marijan Ahel [b], Sanja Babić [b], Tamara Jurina [a], Juan José González Plaza [b], Milena Milaković [b], Nikolina Udiković-Kolić [b]

Show more

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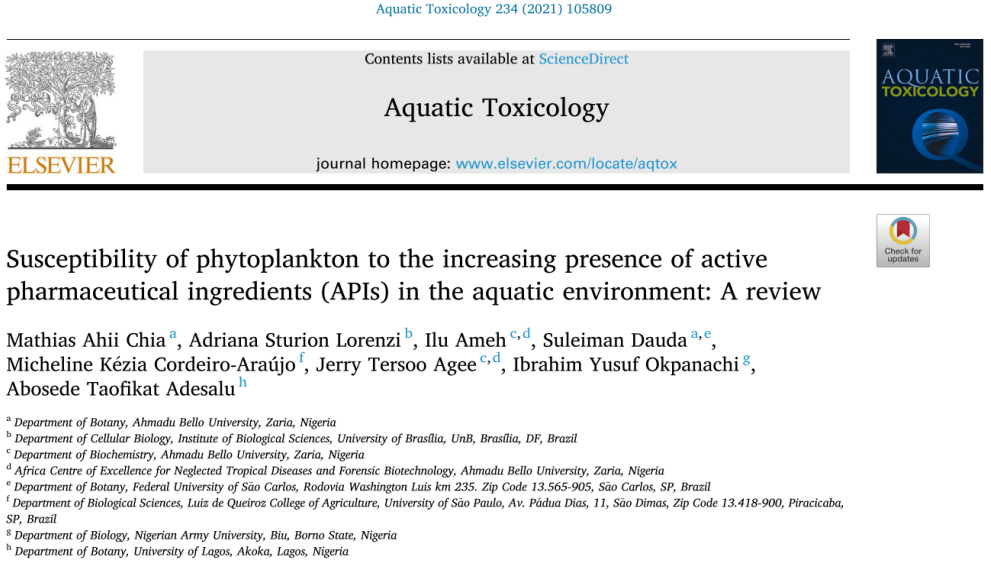


Aquatic Toxicology 234 (2021) 105809

Contents lists available at ScienceDirect

Aquatic Toxicology

journal homepage: www.elsevier.com/locate/aqtox

ELSEVIER

Susceptibility of phytoplankton to the increasing presence of active pharmaceutical ingredients (APIs) in the aquatic environment: A review

Mathias Ahii Chia [a], Adriana Sturion Lorenzi [b], Ilu Ameh [c,d], Suleiman Dauda [a,e], Micheline Kézia Cordeiro-Araújo [f], Jerry Tersoo Agee [c,d], Ibrahim Yusuf Okpanachi [g], Abosede Taofikat Adesalu [h]

[a] Department of Botany, Ahmadu Bello University, Zaria, Nigeria
[b] Department of Cellular Biology, Institute of Biological Sciences, University of Brasília, UnB, Brasília, DF, Brazil
[c] Department of Biochemistry, Ahmadu Bello University, Zaria, Nigeria
[d] Africa Centre of Excellence for Neglected Tropical Diseases and Forensic Biotechnology, Ahmadu Bello University, Zaria, Nigeria
[e] Department of Botany, Federal University of São Carlos, Rodovia Washington Luis km 235. Zip Code 13.565-905, São Carlos, SP, Brazil
[f] Department of Biological Sciences, Luiz de Queiroz College of Agriculture, University of São Paulo, Av. Pádua Dias, 11, São Dimas, Zip Code 13.418-900, Piracicaba, SP, Brazil
[g] Department of Biology, Nigerian Army University, Biu, Borno State, Nigeria
[h] Department of Botany, University of Lagos, Akoka, Lagos, Nigeria

My Research

Aim of Research: To develop a real time capillary electrophoresis method to detect active pharmaceutical ingredients in wastewater and ensure the concentration is below the EPA safe limit.

Expertise and Skills that I can offer:

- Capillary Electrophoresis

Expertise and Skills that would be helpful.
my project:

- Perspective of an environmental scientist

STRATEGIES TO DESIGN BIOPROCESSES

FOR SUSTAINABLE YEAST-BASED PRODUCTION OF RECOMBINANT PROTEINS

Carlos Belloch Molina
Yeast Research Group

Who am I?

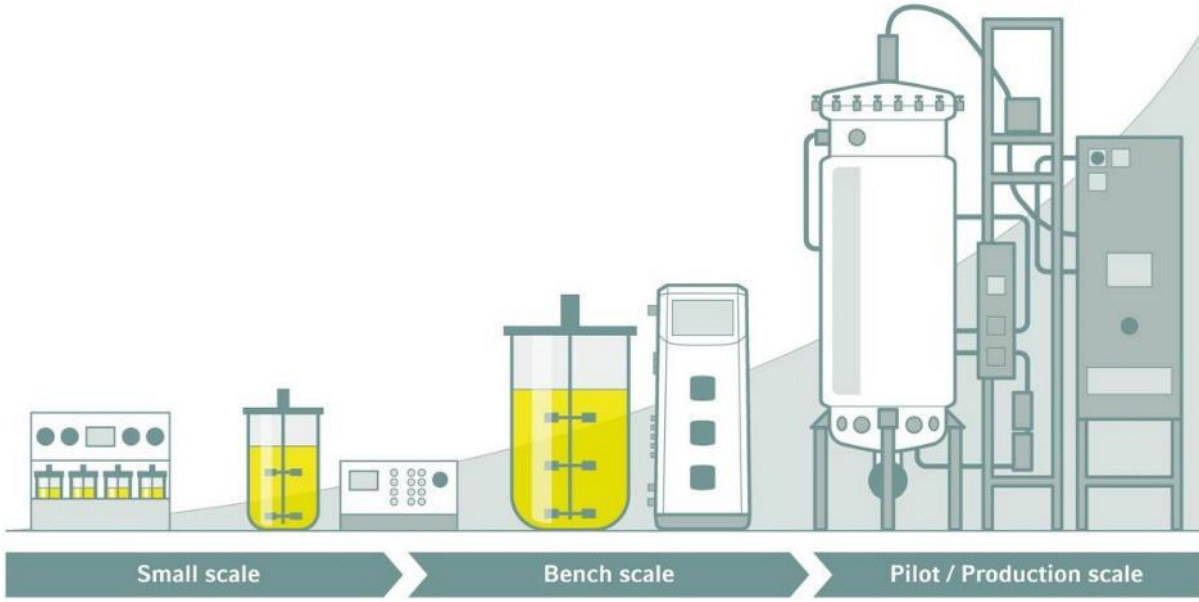
Current problem

Laboratory strains tend to fail when scaled up.

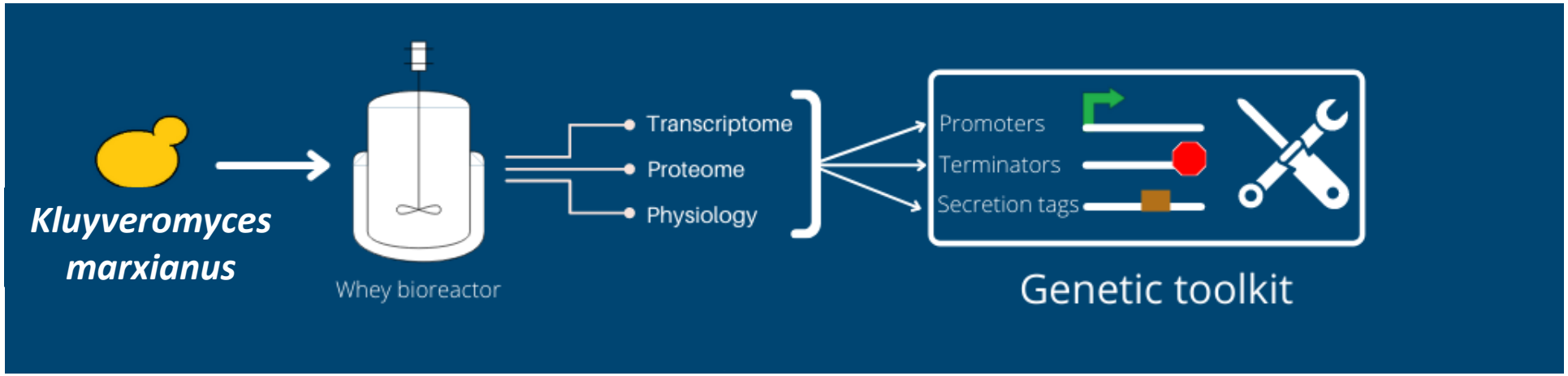
Differences in surface-to-volume ratio lead to appearance of gradients:

- Oxygenation
- Temperature
- Nutrients

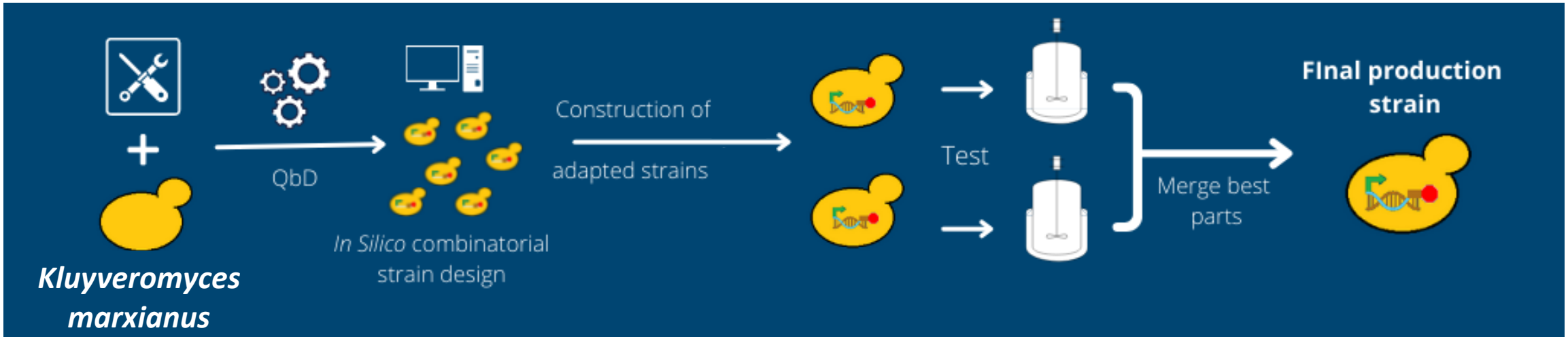
Leading to **Differential gene expression**.



Exploring *K. marxianus* genome



Construction of industrial strain

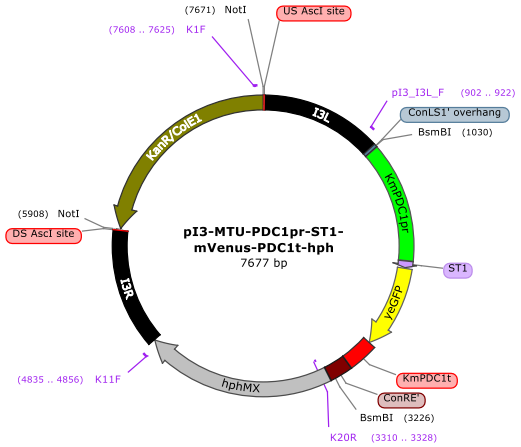


Skills I Offer

Bioreactors

Molecular Biology (especially Golden Gate cloning)

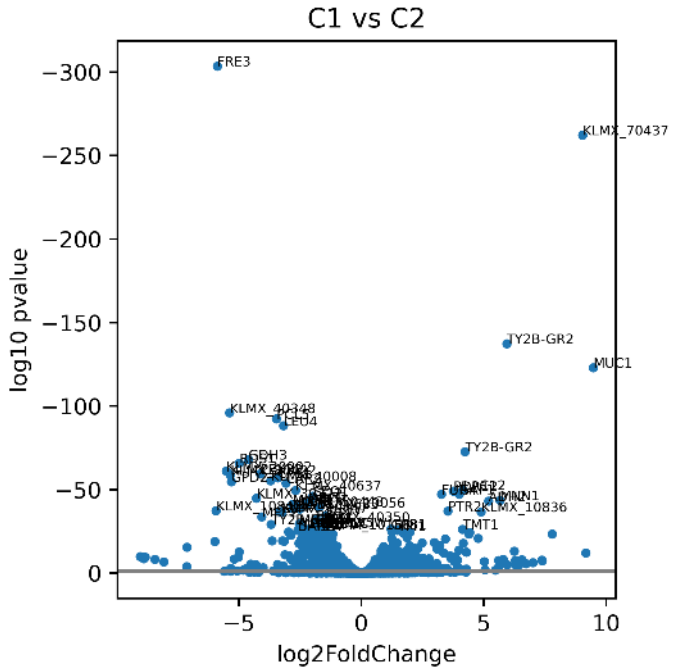
Microbiology



Skills I'm looking for

DNAseq and RNAseq result analysis

Data analysis and statistics



Thank you
Gracias

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University College Cork, Ireland

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An Chomhairle um Thaighde in Éirinn

Environmental Research Institute

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

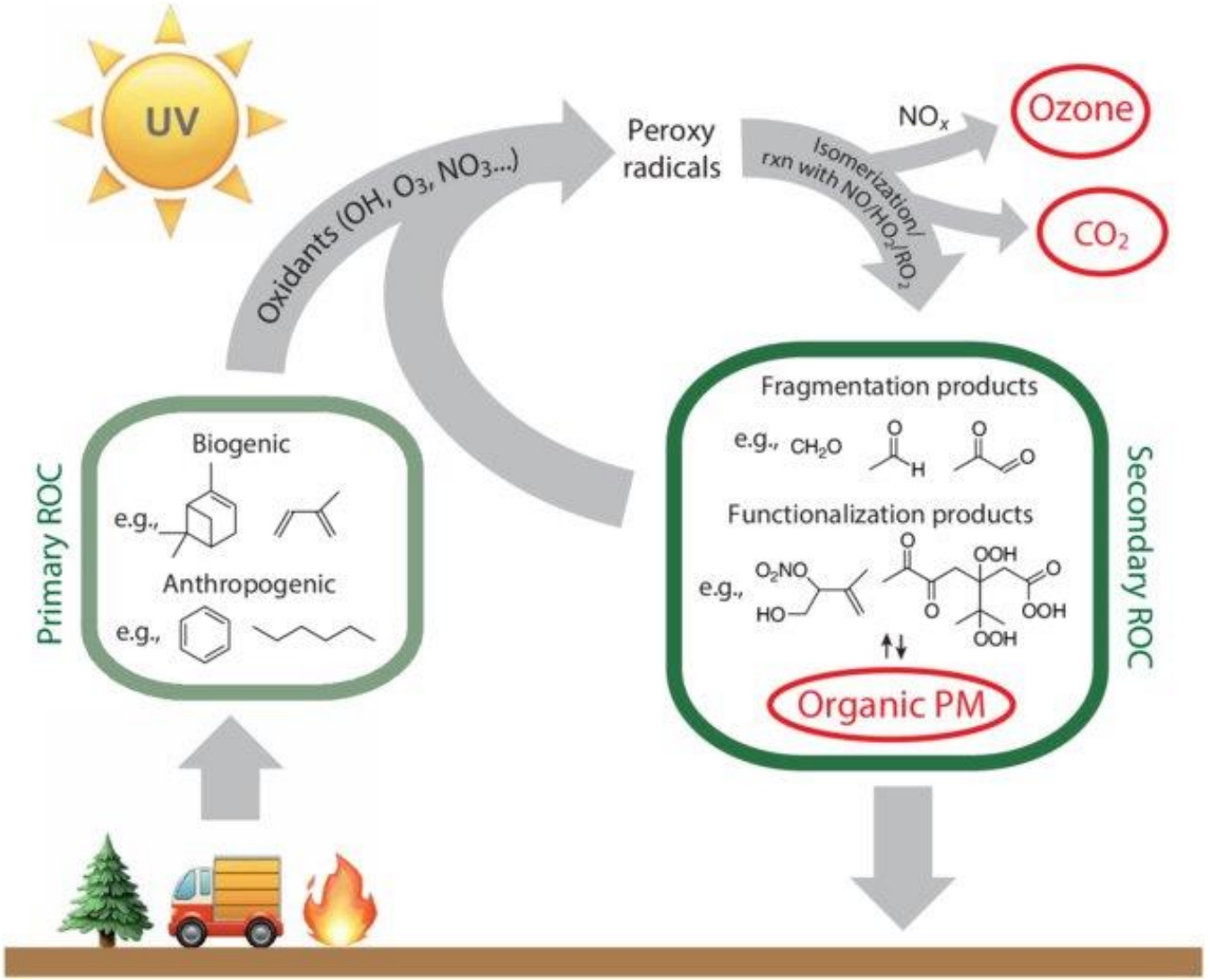
Atmospheric Chemistry of Volatile Organic Compounds

Niall O'Sullivan*
Prof. John Wenger

Centre for Research into Atmospheric Chemistry
CRAC

ucc
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

Introduction



- Volatile organic compounds (VOCs) emitted from both natural and anthropogenic sources
- Atmospheric oxidation results in highly oxidised, low volatility compounds
- Condensation reactions occur producing secondary organic aerosol (SOA) which has a large impact on air quality and climate

Adapted from Heald and Kroll, 2020
https://doi.org/10.1126/sciadv.aay8967

Environmental Research Institute

Centre for Research in Atmospheric Chemistry CRAC

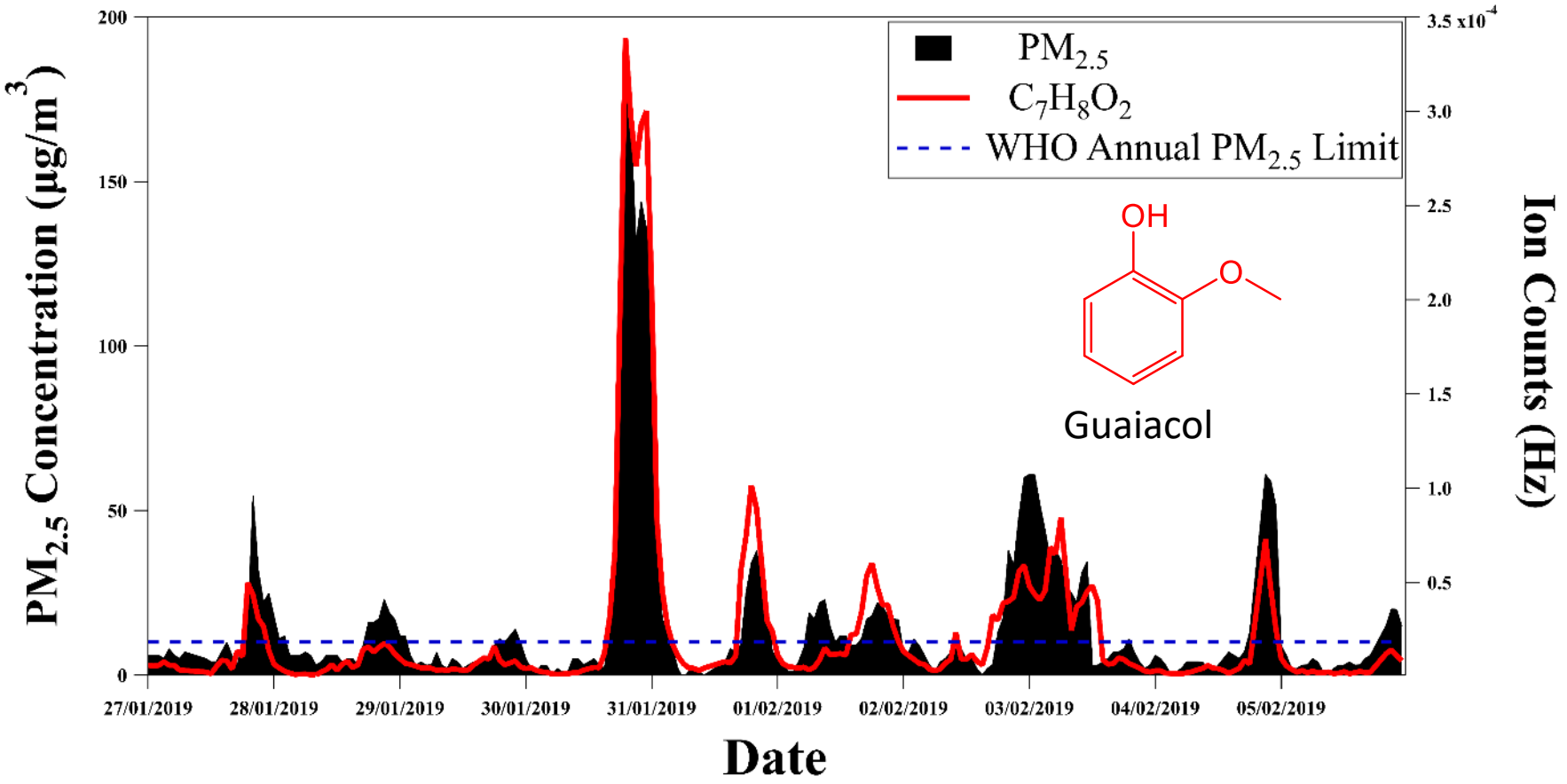
ucc Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

epa Environmental Protection Agency

Chemical Ionisation Mass Spectrometry

- Online mass spectrometry for simultaneous measurements of VOCs and SOA

Wintertime Air Pollution in Cork



- Significant pollution observed in the evenings
- Strong correlation between $PM_{2.5}$ and organic wood burning tracers

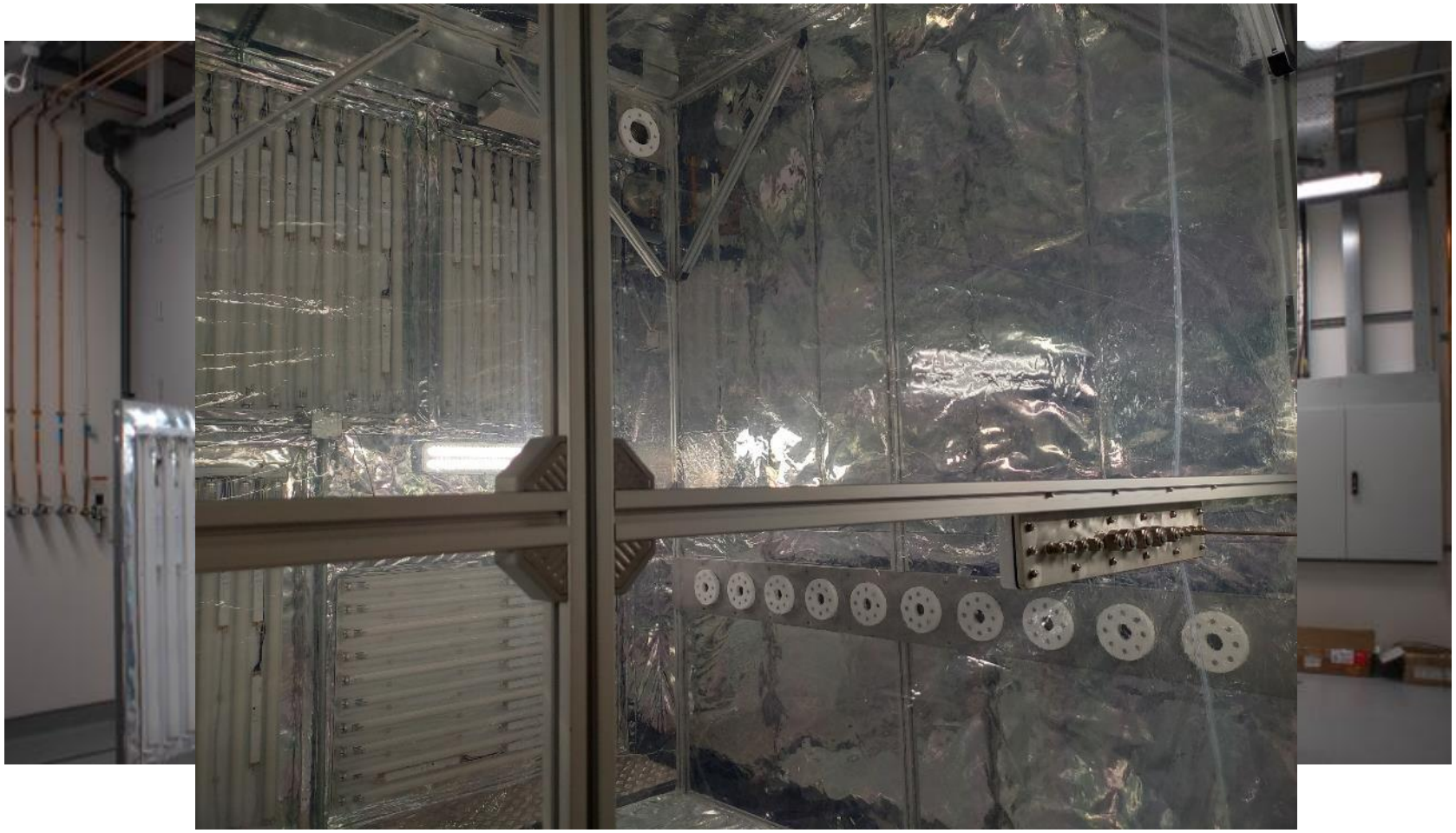
Environmental Research Institute

Centre for Research in Atmospheric Chemistry CRAC

ucc Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

epa Environmental Protection Agency

Atmospheric Simulation Chamber



- Replication of real world conditions in a controlled environment
- Studies performed on a range of different VOCs to investigate chemical degradation pathways

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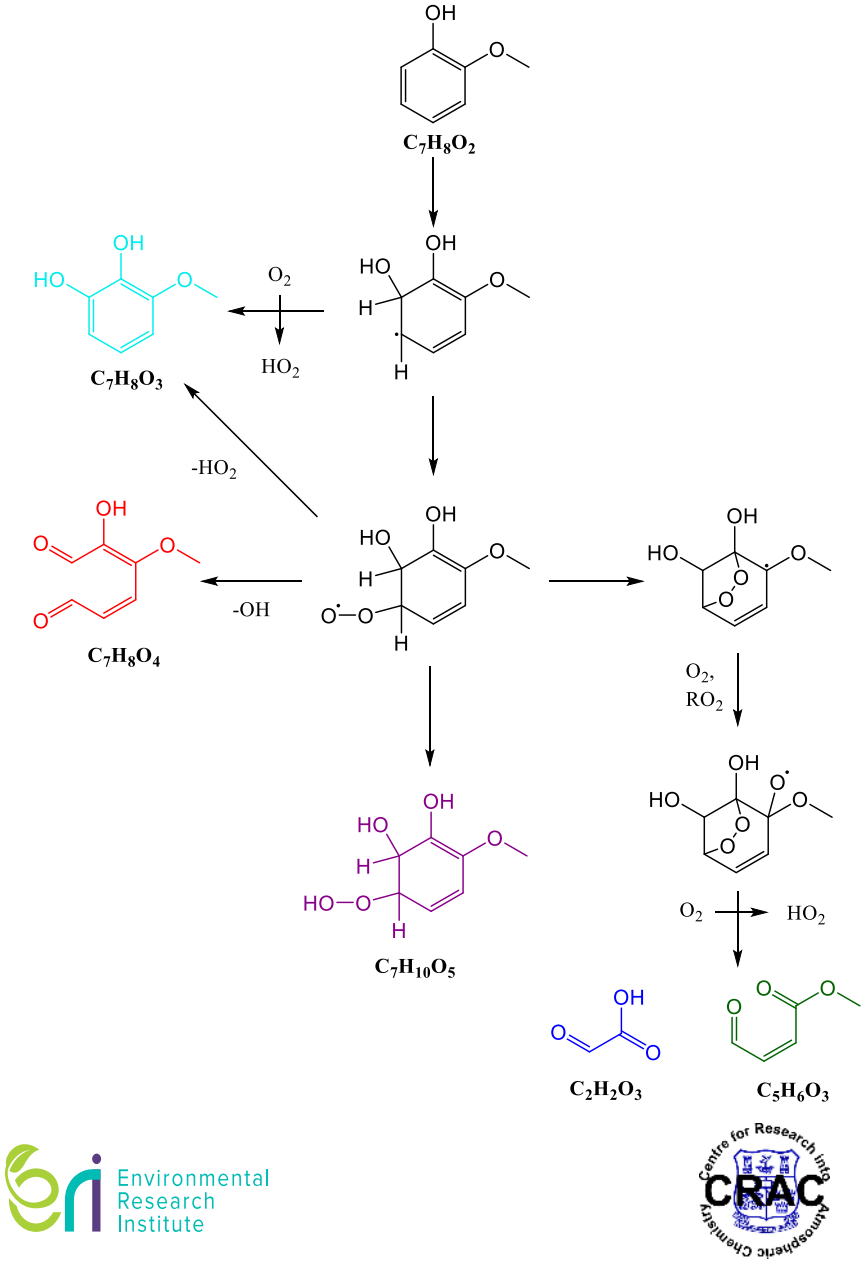
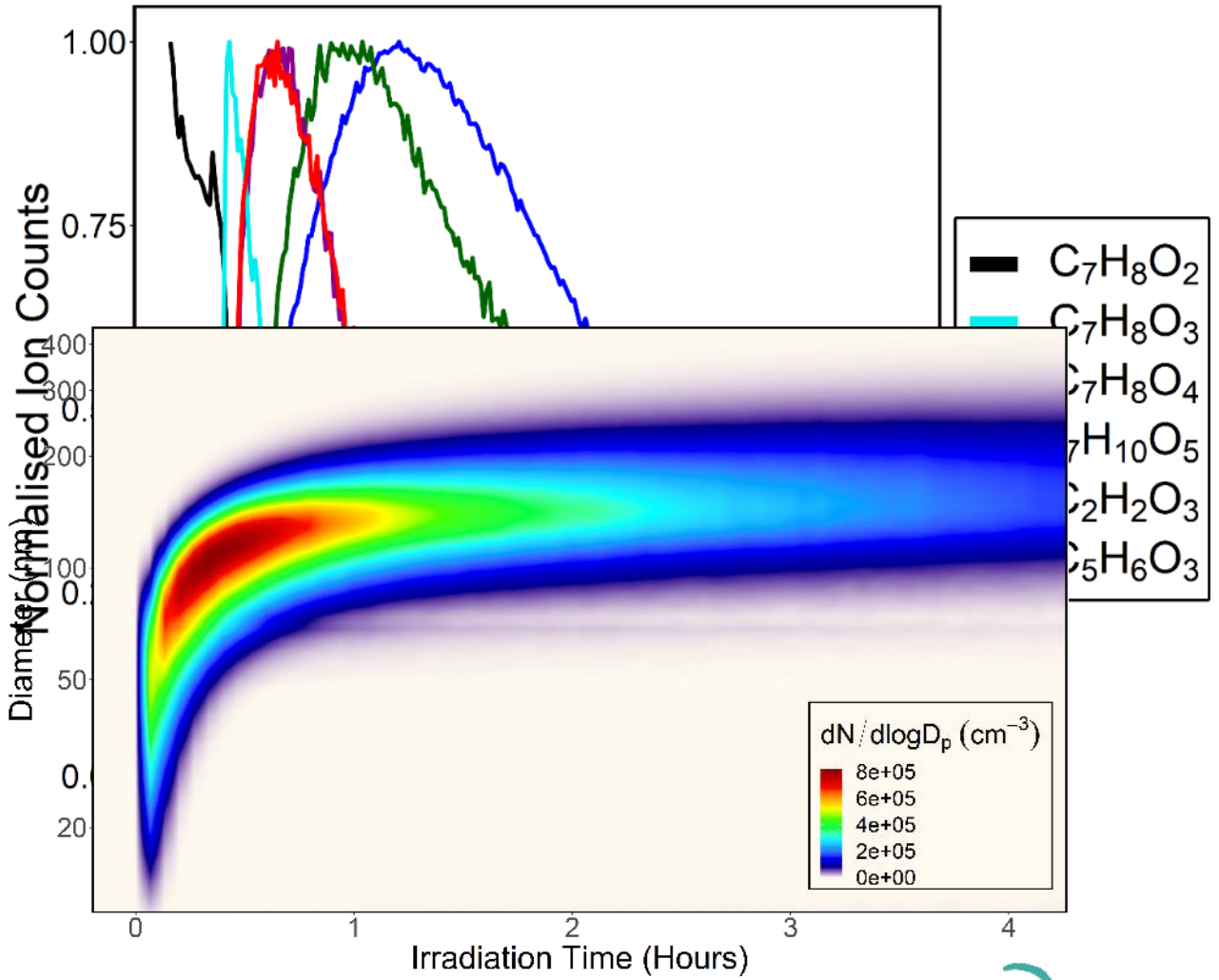
epa Environmental Protection Agency

Simulation Chamber Results





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Expertise and Skills that I have developed

- Field campaign design and management
- Designing and conducting atmospheric simulation chamber experiments
- Online mass spectrometry in field and lab
- Data analytics and processing

Thank you!

Environmental Research Institute

Centre for Research in Atmospheric Chemistry CRAC

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epa Environmental Protection Agency

Duck-Feed

Sustainable protein from duckweed

Cian Redmond

B.Sc. Applied Plant Biology – UCC

PhD – Environmental Sciences

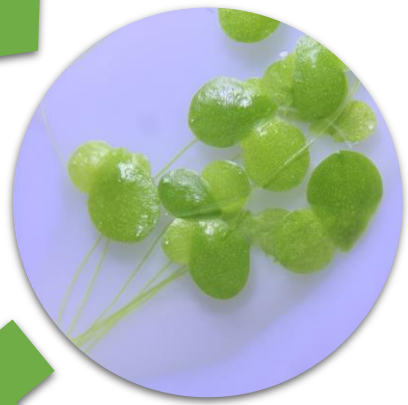
Duck-Feed Project – Prof. Marcel Jansen

Environmental Research Institute

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Farm Waste



Duckweed (*Lemna minor*)

GREEN Protein

Native Protein Source

High Protein Feed

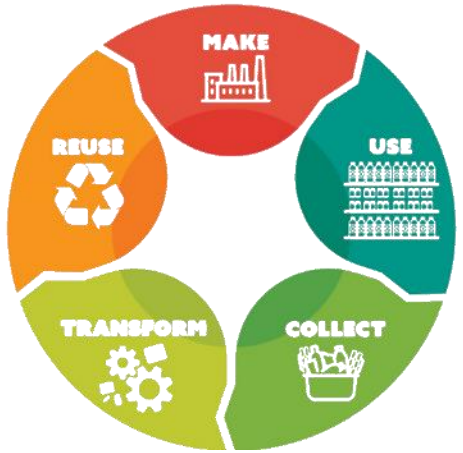
LINEAR ECONOMY

Materials in a **Linear Economy** create waste after use.

VS.

CIRCULAR ECONOMY

Materials in a **Circular Economy** are collected and reused after each use.



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Department of Agriculture, Food and the Marine

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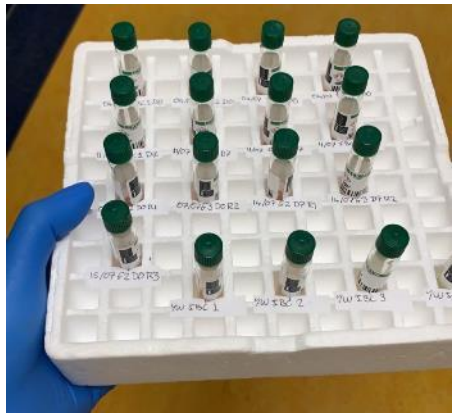
Duck-Feed
Sustainable protein from duckweed

Expertise and Skills that I can offer



- Cultivation of Duckweed
- Water quality analysis – Total nitrogen & phosphate

Expertise and Skills that would be helpful for my project

- Waste water treatment
- Experience with agricultural waste streams

Duck-Feed
Sustainable protein from duckweed

Environmental Research Institute

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Duck-Feed
Sustainable protein from duckweed

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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FLOAWER
FLOAting Wind Energy networK

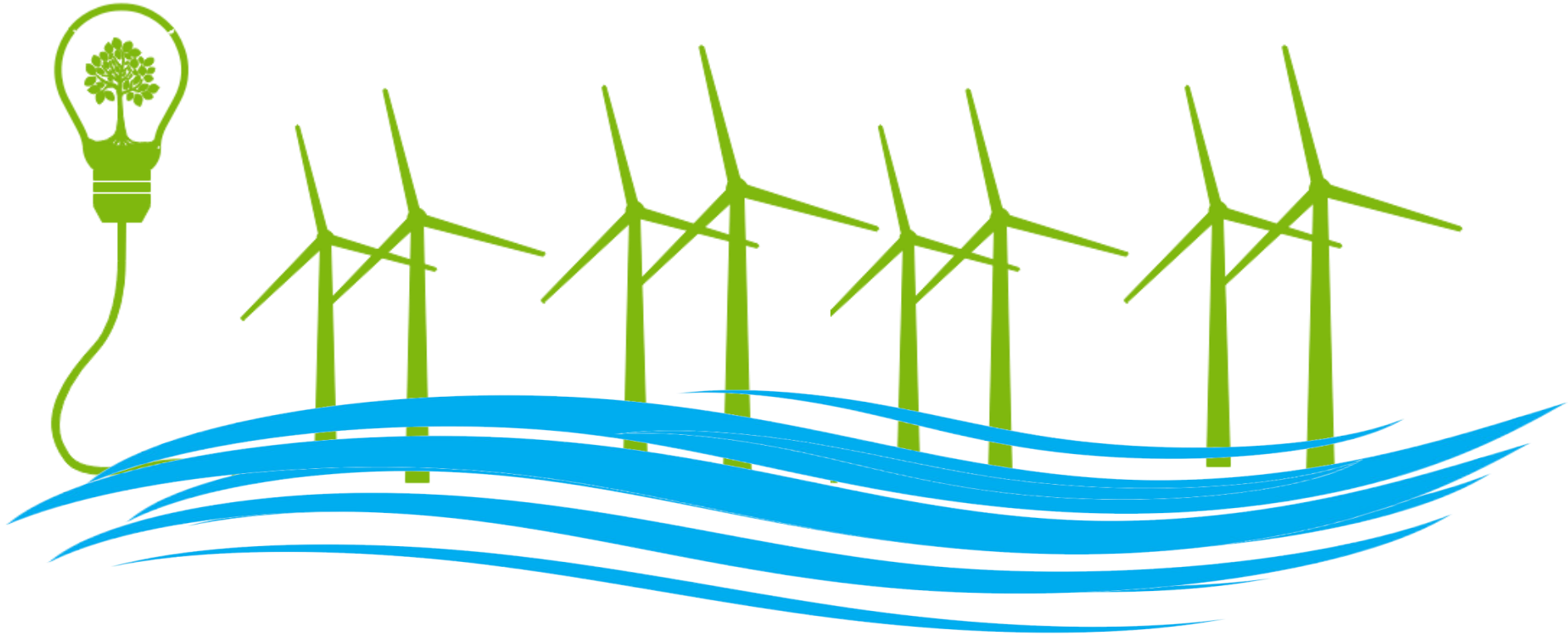
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement N° 860879.

ADVANCED PHYSICAL MODELLING METHODS FOR FLOATING WIND TURBINES

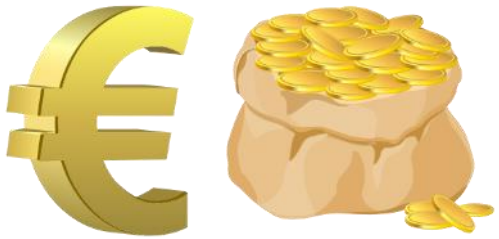
PhD candidate: *Navid Belvasi*
Supervisor: *Dr. Jimmy Murphy*
Advisor: *Dr. Cian Desmond*

Research for a Sustainable Future

❑ **What is my research project about & why is it important?**

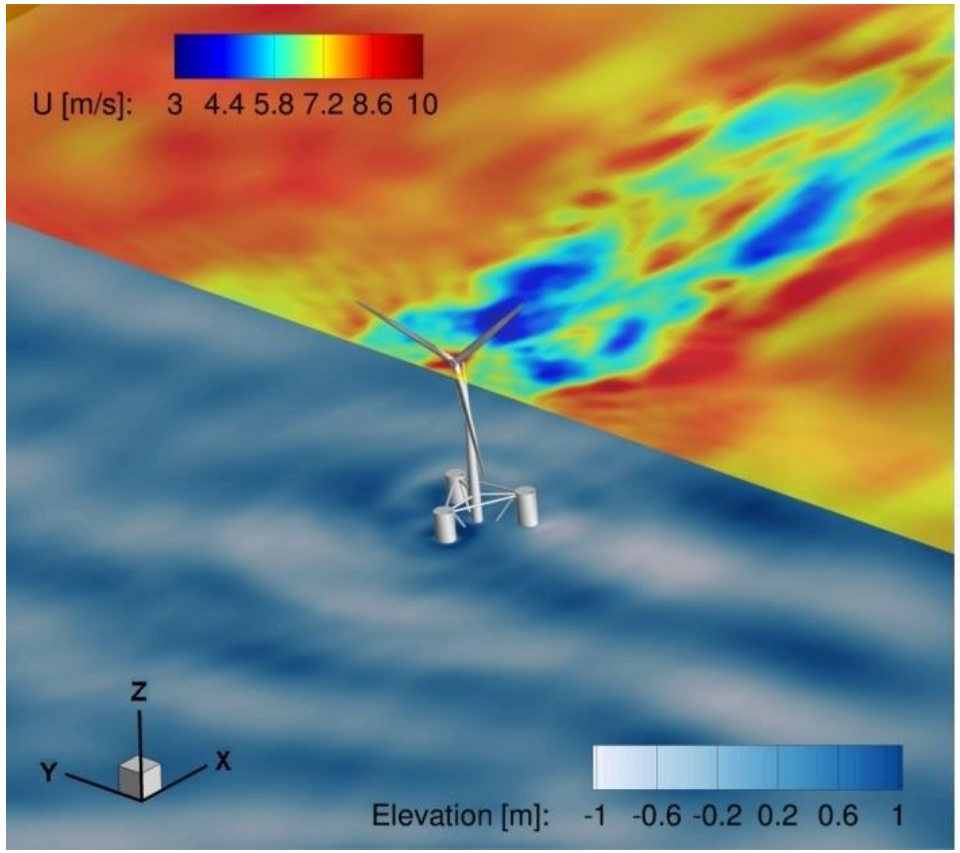


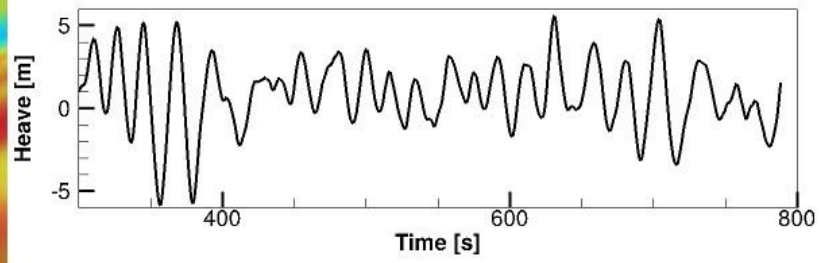
- **Cost**

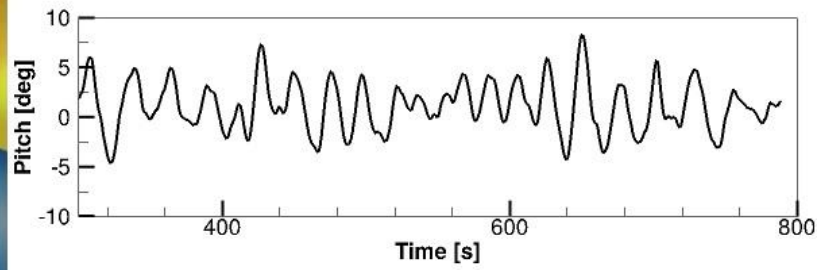


- **Simulation codes**

- Lack of High quality open-sources validation data
- A robust open access validation data sets is required

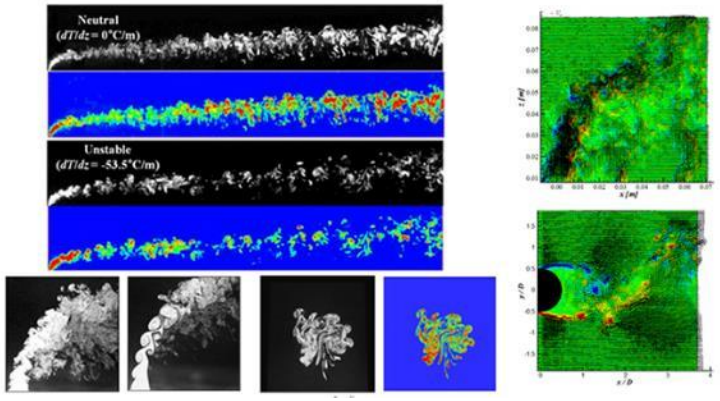


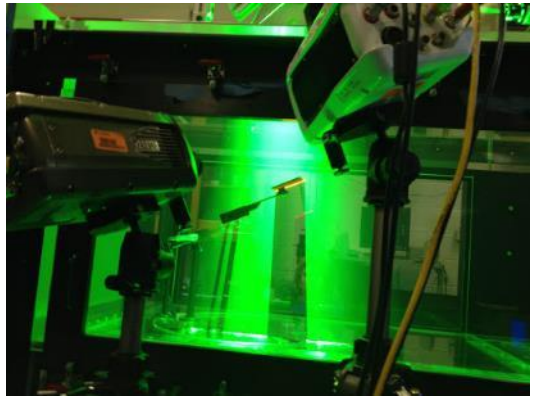


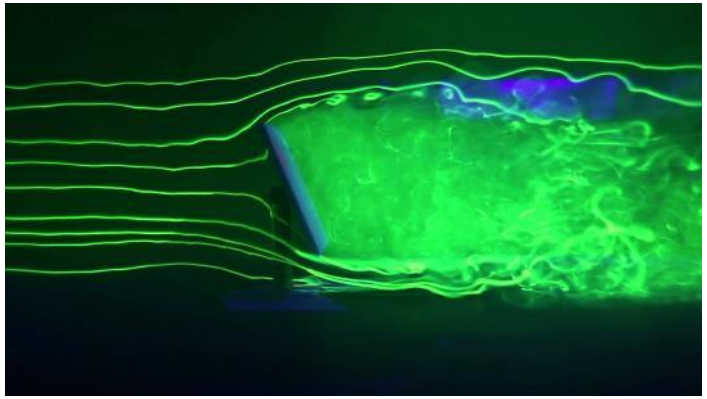


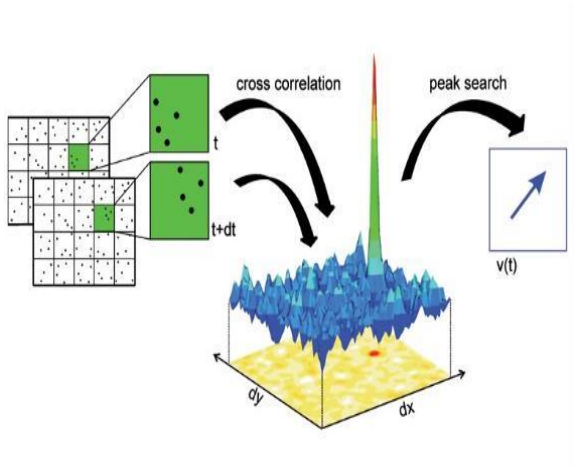
[Energy.gov]

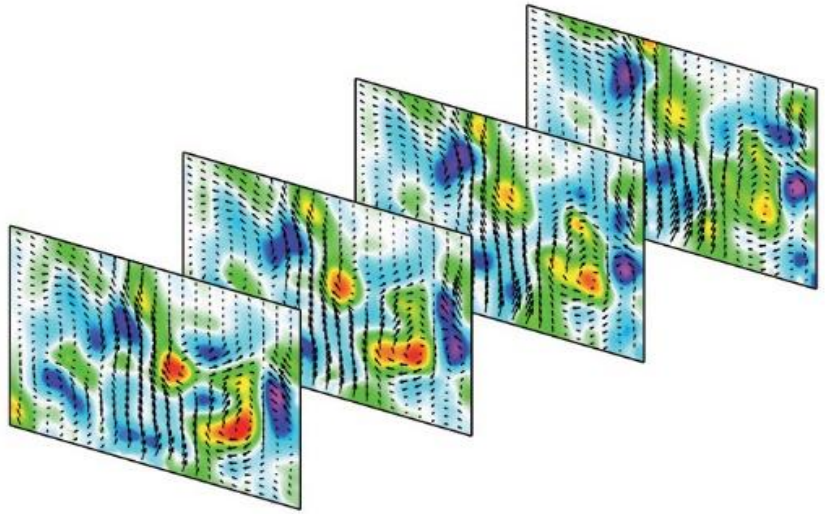
[MaREI/ LiR]











❖ **Aim of current research**

1. Producing high quality validation datasets
2. Advance the state of the art of physical testing

❑ Expertise and Skills that I can offer

1. *Numerical simulations of multiphase flows with method as CFD, BEM, etc.*
2. *Experimental tank test data*
3. *Coding in Python, MATLAB*
4. *Simulations in Ansys Fluent*
5. *My 7 years of experience in fluid dynamics and ocean engineering*

❑ Expertise and Skills that would be helpful for my project

1. *Would like to collaborate with numerical developers in the field of offshore renewable energy*

https://www.researchgate.net/profile/Navid_Belvasi

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Dónal Ó Céileachair

CEEES Research Group

3rd (final) year PhD

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Gas Networks Ireland

Research for a Sustainable Future

What is your research project about & why is it important?

Project

Developing **Eco**nomic Solutions for on-farm **A**naerobic **D**igestion in Ireland – **EcoAD**

My work

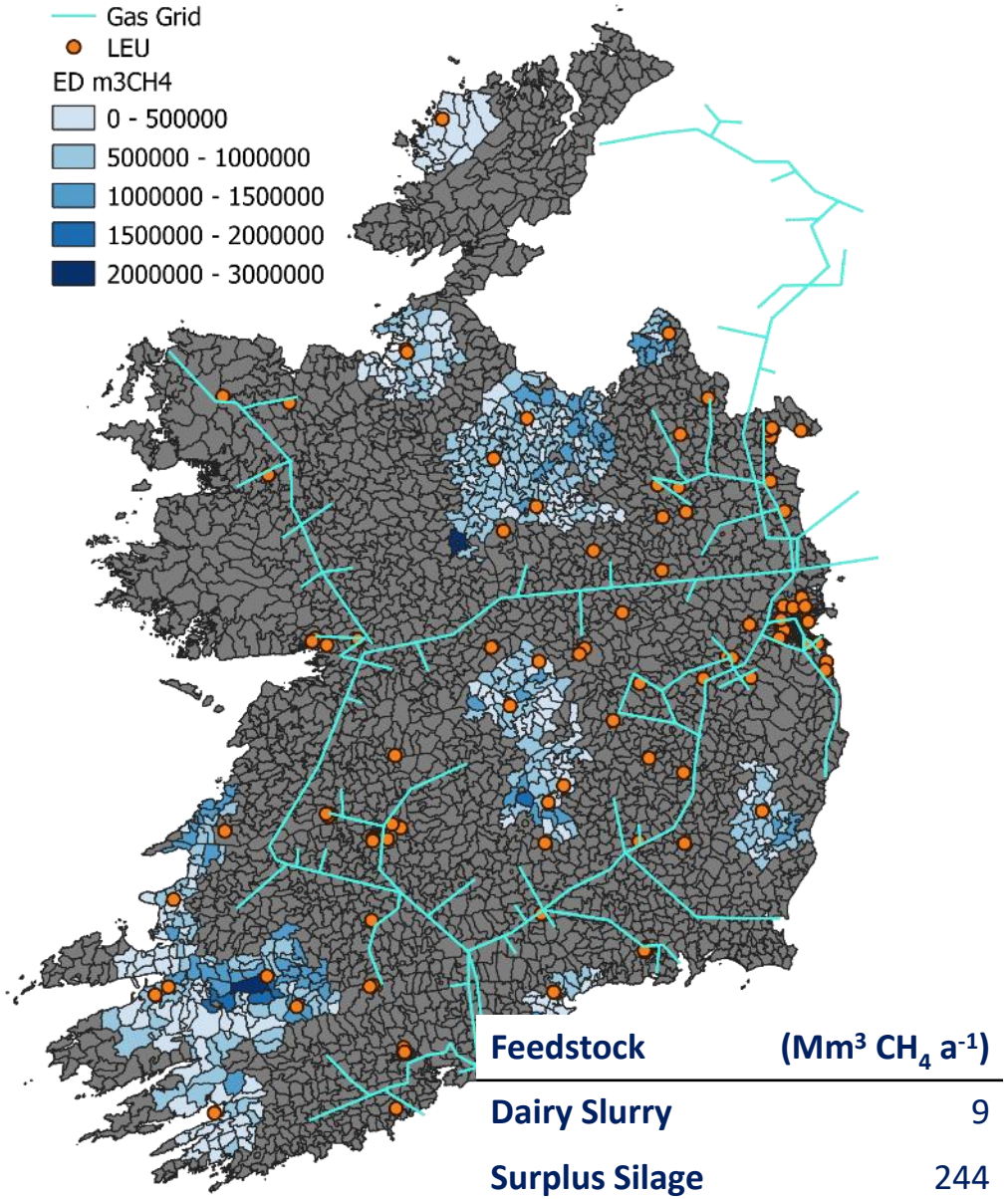
Optimising the logistics of on-farm AD in Ireland

- What is the resource?
- Where is the resource?
- When is the resource available?
- How do we get the resource?
  - Virtual pipeline
  - Biogas pipeline

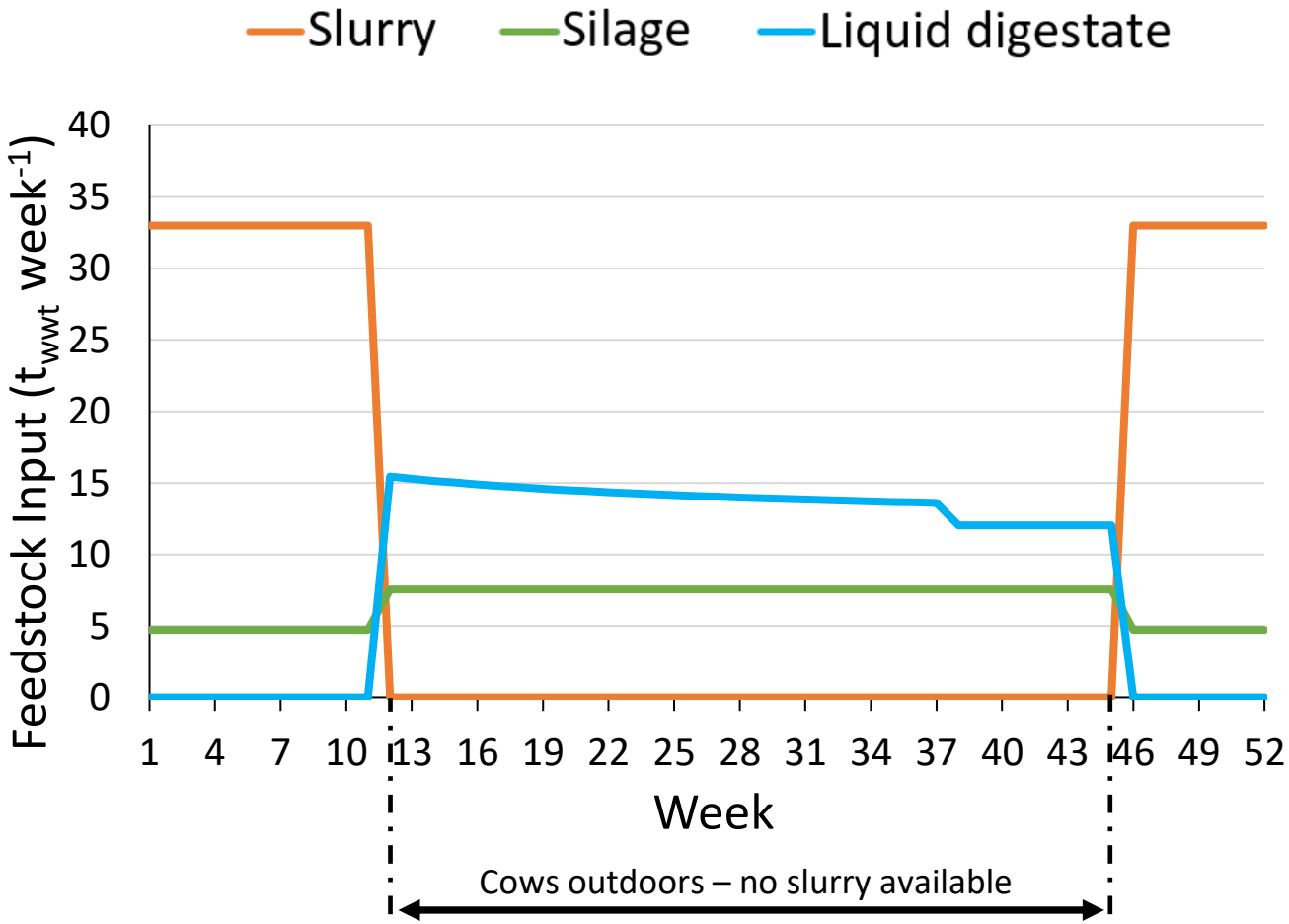
EcoAD

Developing Economic solutions for on-farm Anaerobic Digestion technologies under Irish conditions

What is the resource, where is it, and when is it available?



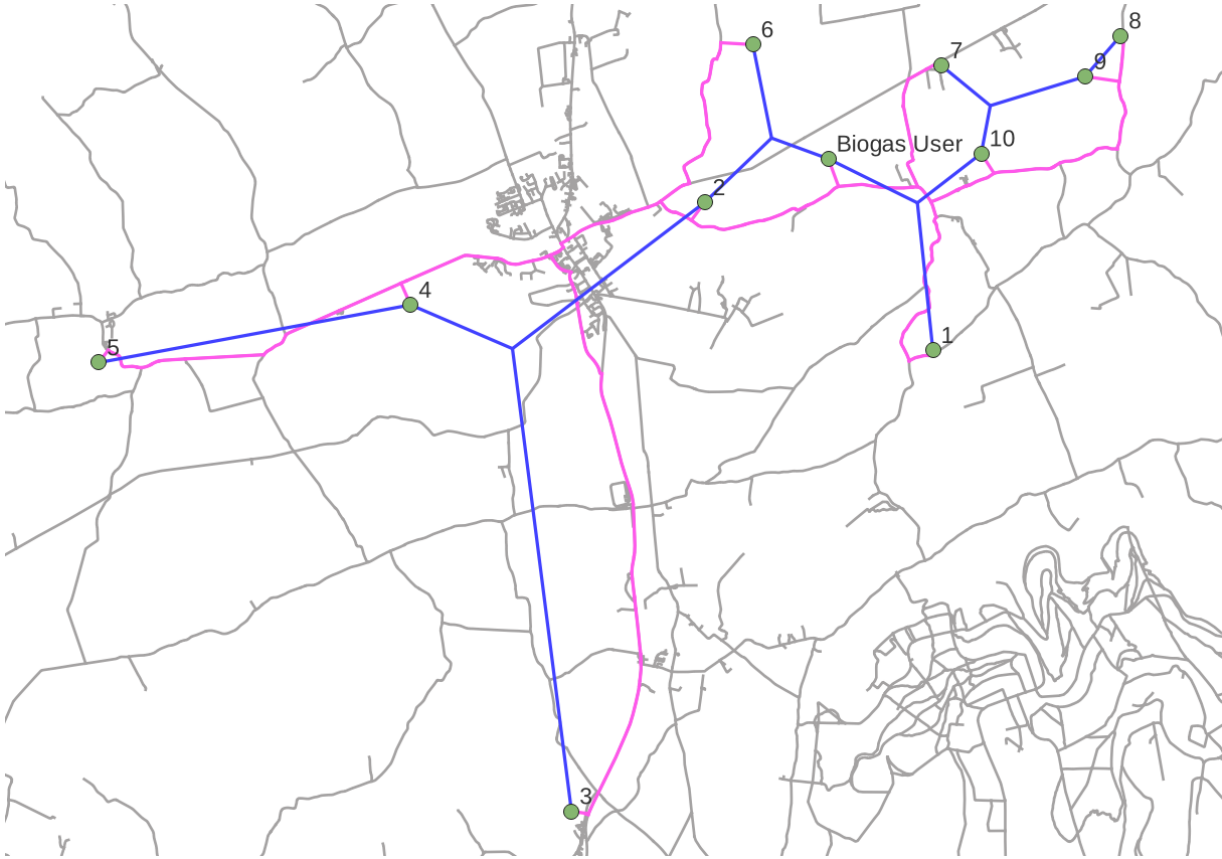
Feedstock	(Mm³ CH_4 a^{-1})
Dairy Slurry	9
Surplus Silage	244



How do we get the resource from producer to user?

In general, two ways to design pipeline network layouts

- Minimum Spanning Tree (MST)
- Follow road network



10 AD plants

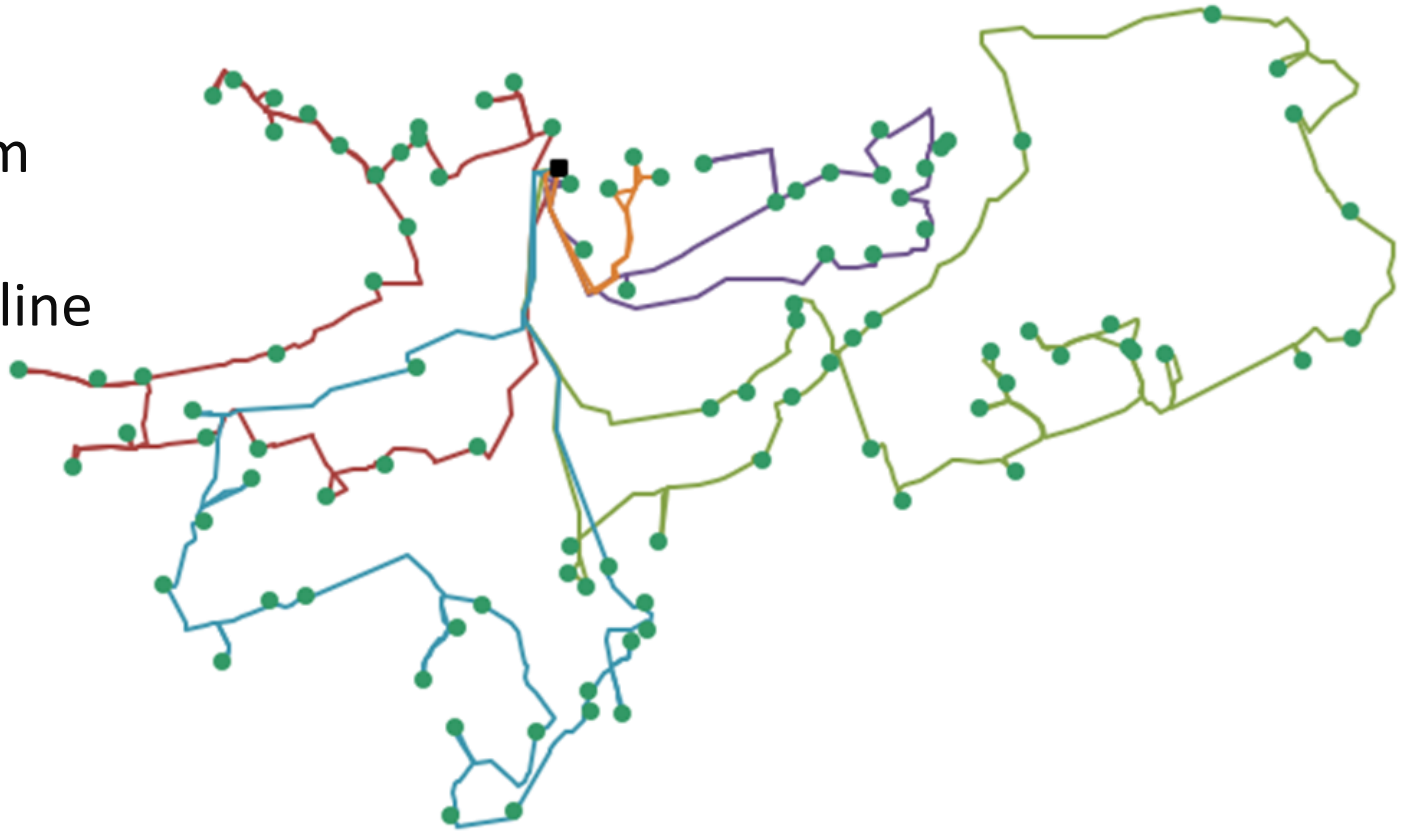
MST pipeline is 24.4km (blue)

Road network pipeline is 31.9km (pink)

How do we get the resource from producer to user?

How to optimise and model a virtual pipeline serving 100 farms?

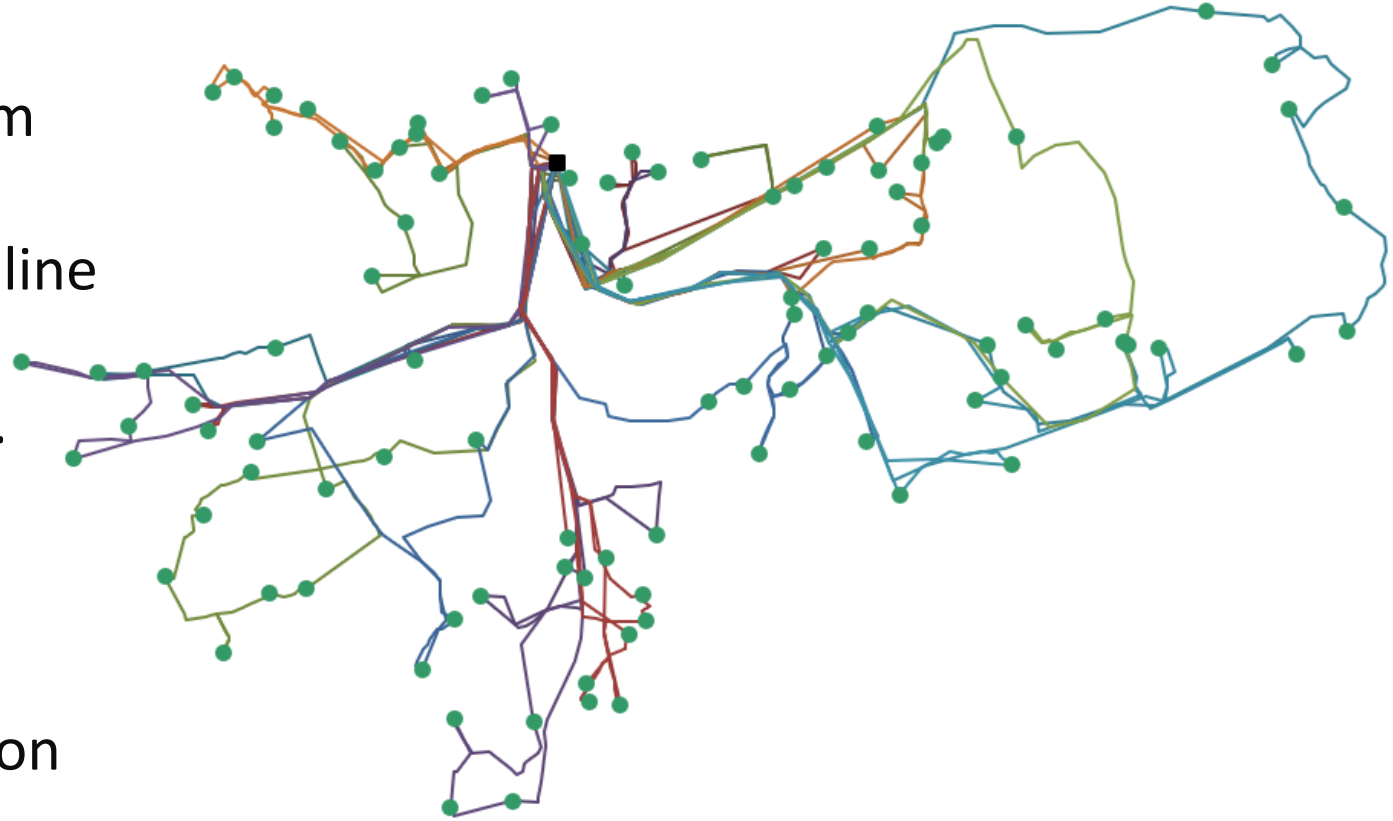
- Similar to Vehicle Routing Problem (VRP)
- Compared traditional virtual pipeline to a mobile-upgrading and compression unit virtual pipeline.
- Traditional virtual pipeline
  - 5 routes, around 20 sites each route
  - 204 km in total
  - 6-7 mins on each site



How do we get the resource from producer to user?

How to optimise and model a virtual pipeline serving 100 farms?

- Similar to Vehicle Routing Problem (VRP)
- Compared traditional virtual pipeline to a mobile-upgrading and compression unit virtual pipeline.
- Traditional virtual pipeline
  - 5 routes, around 20 sites each route
  - 204 km in total
  - 6-7 mins on each site
- Mobile-upgrading and compression unit virtual pipeline
  - 28 routes, 3-4 sites each route
  - 591 km in total
  - 4-6 hours on each site



Expertise and Skills that I can offer

Excel

QGIS

Biomethane sustainability

Expertise and Skills that would be helpful for my project

Coding (Python, SQL, etc.)

PowerBI

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Hanan Alatawi

Sensing and Separation Group, Life Science Interface Group, School of Chemistry, University Cork College

Supervisor: Dr. Eric Moore

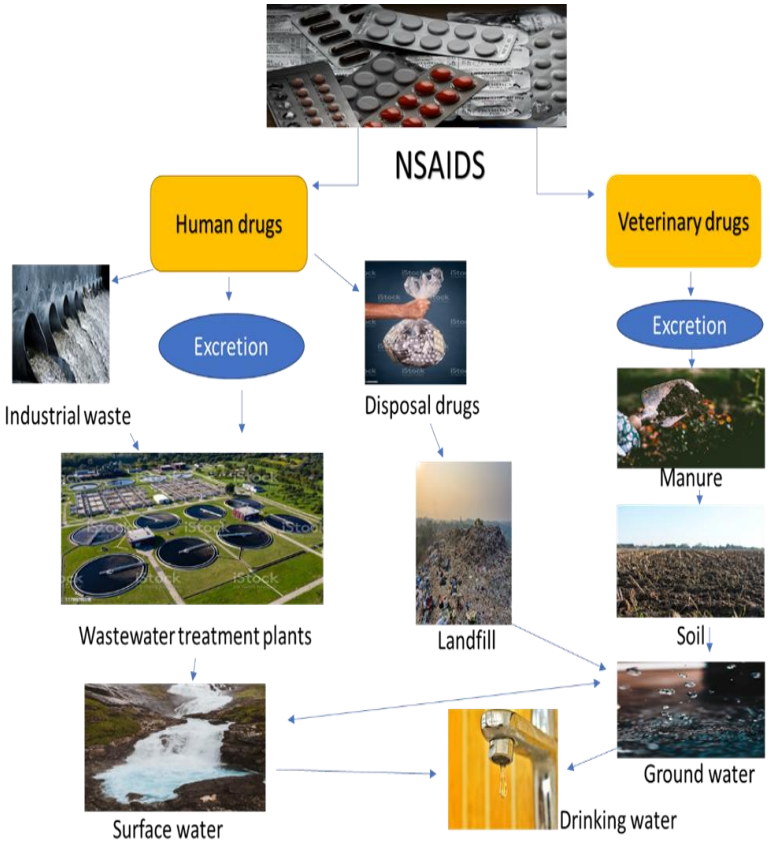
This project funded by the Ministry of Higher Education of Saudi Arabia

What do you like to do when you're not researching? feel free to include a photo!

Reading, baking, traveling…

وزارة التعليم
Ministry of Education

Research for a Sustainable Future



Conventional wastewater treatments (WWTPs)

% Removal of NSAIDs 10 -30%

Because of

- Physiochemical properties of NSAIDs
- Poor degradation of these pharmaceuticals

Advance WWTPs

% Removal of NSAIDs 70-90%

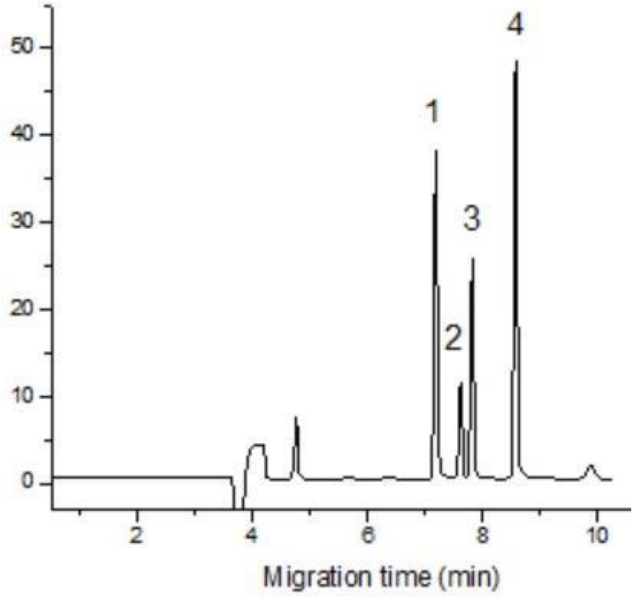
However

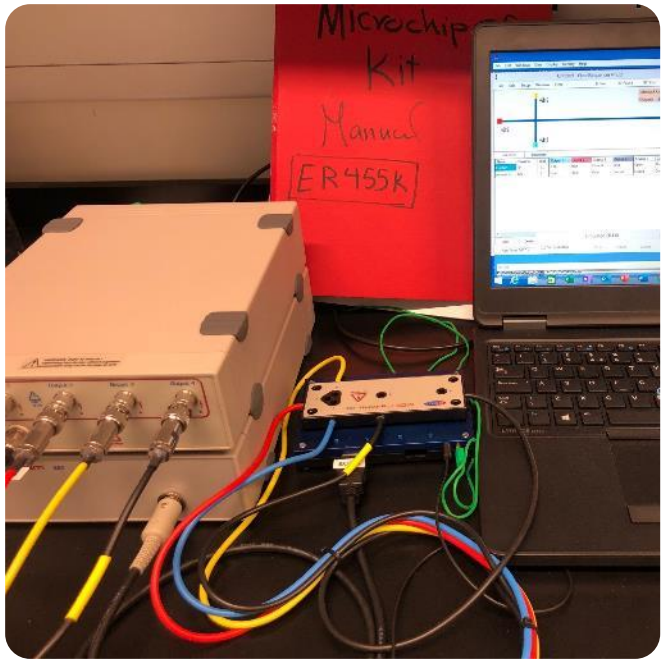
Advance WWTPs have disadvantages:

- Expensive
- Consuming more energy (not green)

What is your research project about & why is it important?

- My project is focusing on developing methods to detect NSAIDs in wastewater
- Non-steroidal anti-inflammatory drugs (NSAIDs) are one of the most frequently used pharmaceuticals internationally. NSAIDs (DIC, IB, and NAX) are included in the list of the top 10 persistent pollutants. NSAIDs are frequently detectable at concentrations ranging from ng/L to mg/L in a variety of environmental water. It has been well established that conventional wastewater treatment is incapable of degrading the majority of these pharmaceuticals due to their physicochemical properties and low biodegradation potential. As a result, several pharmaceuticals are released back into the environment.





Expertise and Skills that I can offer

Capillary electrophoresis

Microchip electrophoresis

Solid phase extraction

Expertise and Skills that would be helpful for my project

To gain access to wastewater treatment plants located around the country

Daniel Falk

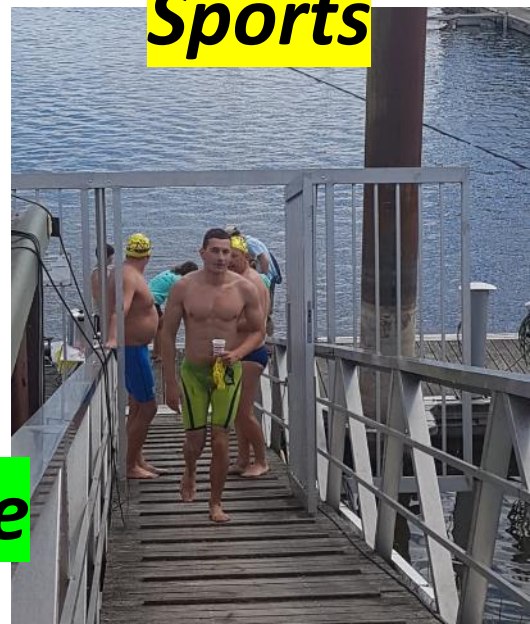
PhD candidate, School of BEES
Palaeobiology Research Group

Travel

Geology & Excavations

Sports

Postgrad Rep



Poetry & Prose

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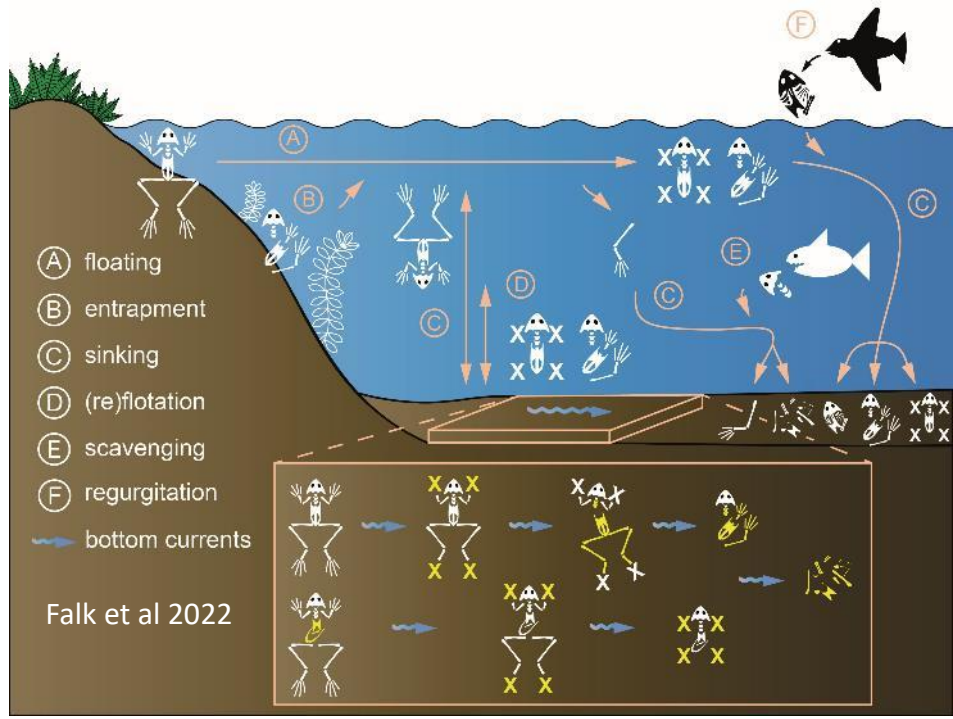
FOSSIL COLOUR @ UCC

Geiseltal Fossil Collection, Germany



Taphonomy:

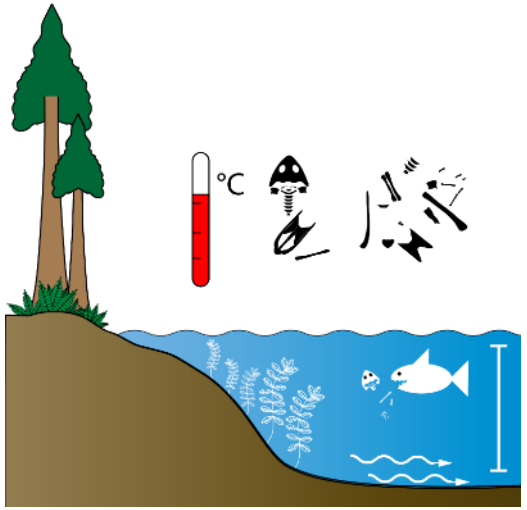
study of how organisms decay and become fossilized or preserved in the paleontological record

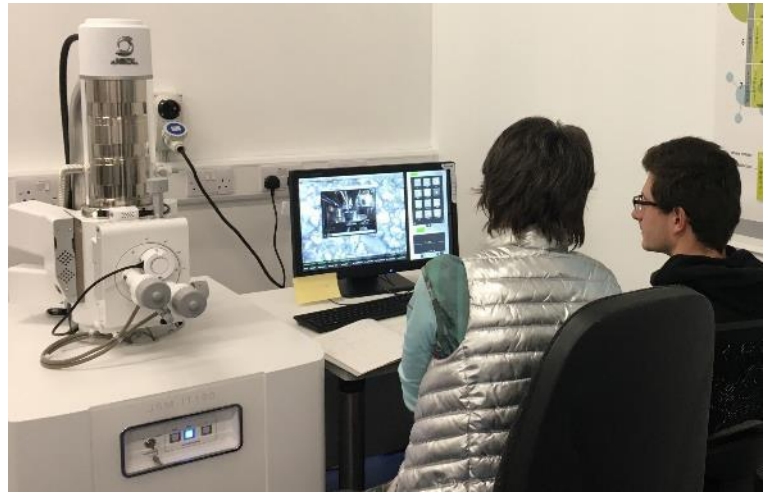
Why?

- study ancient environments (flora & fauna)
- understanding continent & climate change & the adaptation of organisms
- To learn from that!

Expertise and Skills that I can offer

- SEM + EDS + Sample Coating
- Geology & Frog Knowledge ☺ (anatomy, lifestyle…)
- Adobe Illustrator
- Publishing





SEM - scanning electron microscope
EDS - energy dispersive X-ray spectroscopy

Expertise and Skills that would be helpful for my project

- Statistics, Chemistry
- Thesis writing
- Photography (ISO, aperture…)

Tell us about yourself!

My name is Julian Suarez

I’m at the Centre for Law and the Environment, UCC School of Law

When I’m not researching I like to listen to and play music

What is your research project about & why is it important?

My research project is about the substantive and procedural implications of rights of nature (RoN) as an alternative/supplement to current environmental protection

It's important because it allows for modelling of a RoN definition and typology and for studying its effectiveness and its interactions with other principles, rules and values

Expertise and Skills that I can offer

Legal research skills, writing, English and French proficiency

Expertise and Skills that would be helpful for my project

Comparative law research methods, analytical and creative thinking, presentation skills, networking

Hannah Mealy

- PhD Researcher
- Department of Geography at UCC
- Supervisors Dr. Paul Leahy &

  Dr. Fiona Cawkwell

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University College Cork, Ireland
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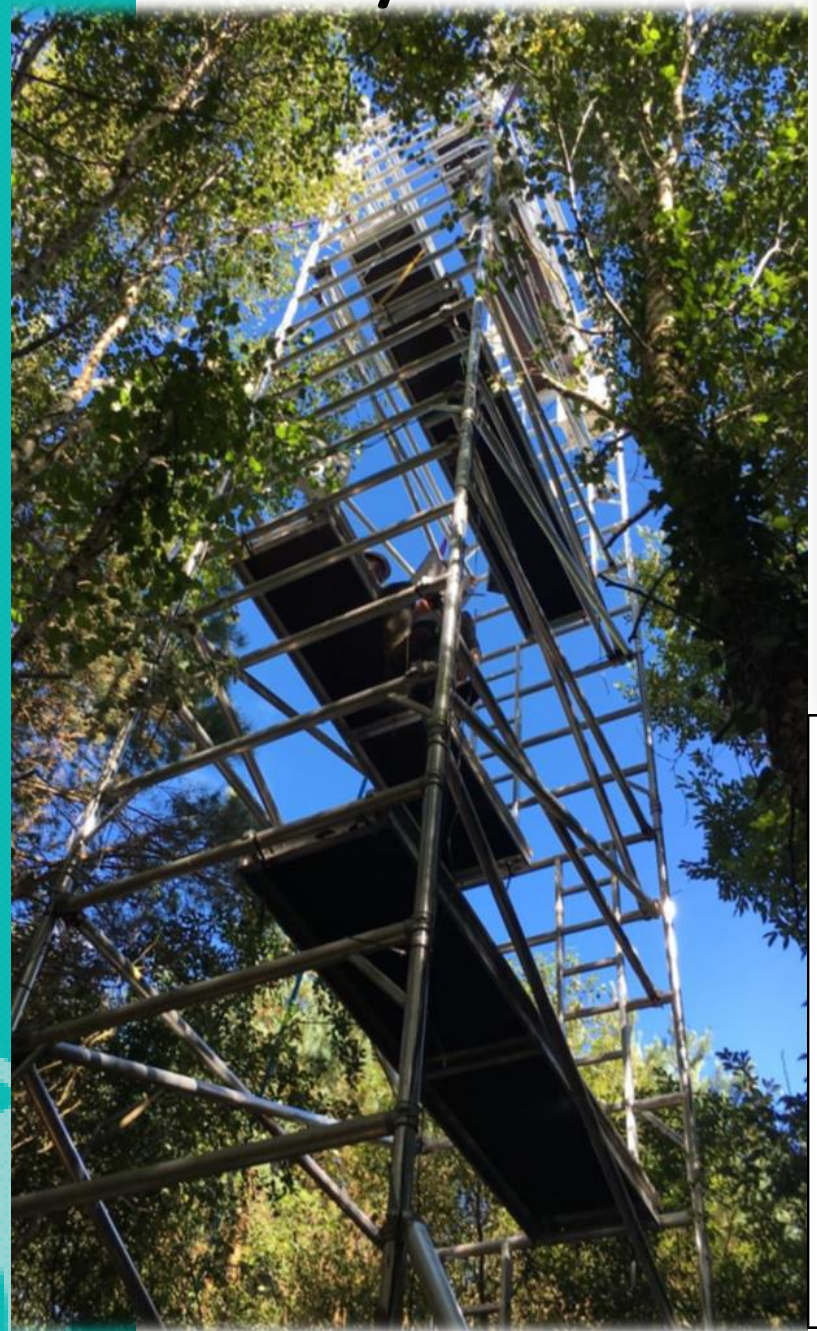
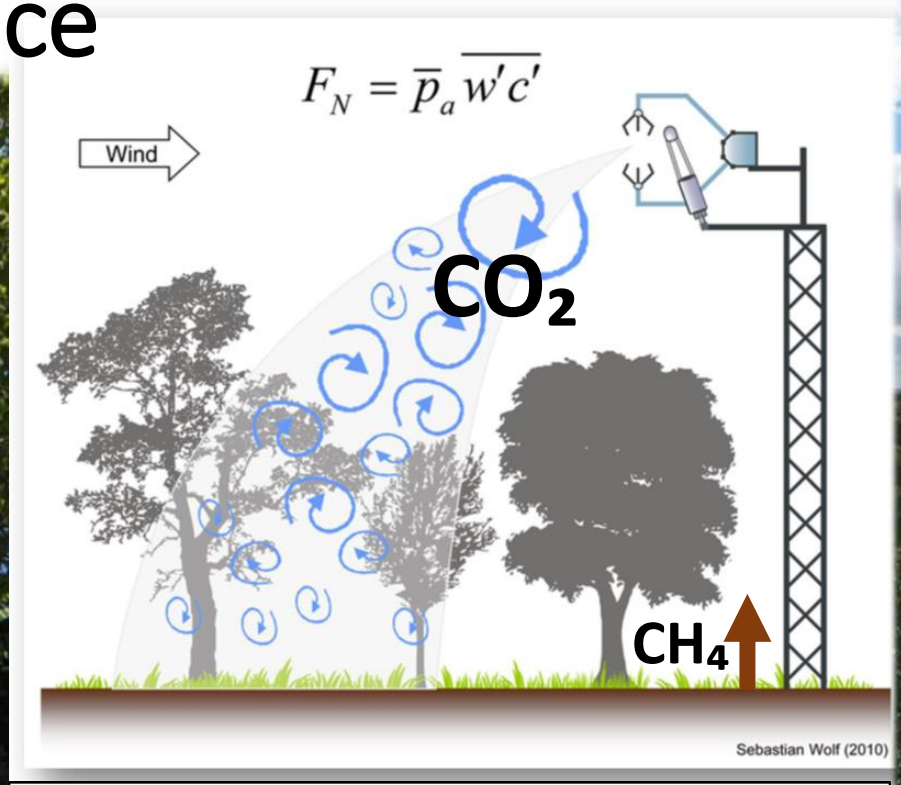
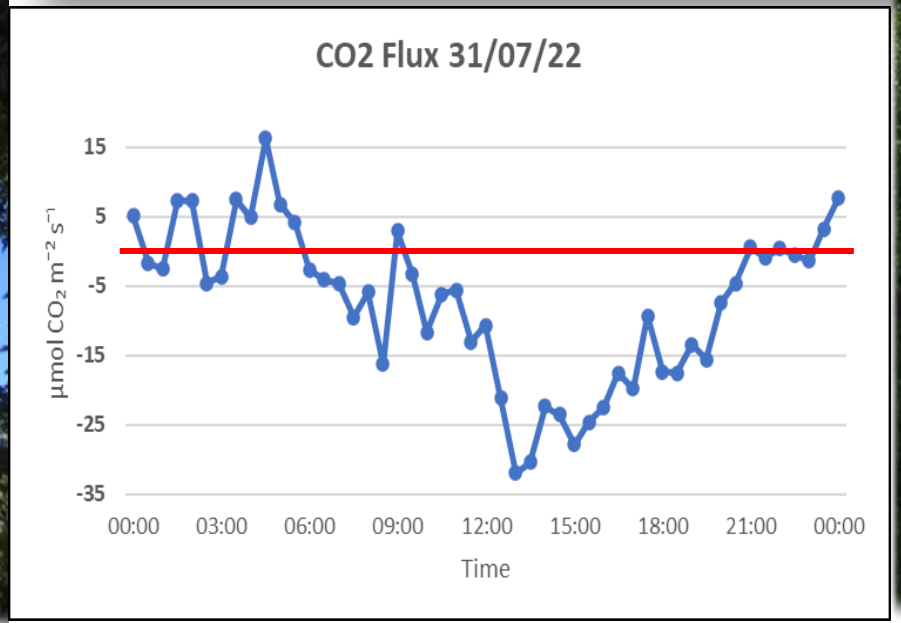
BORD NA MÓNA
Naturally Driven

Lullymore
Heritage and Discovery Park

Eddy Covariance

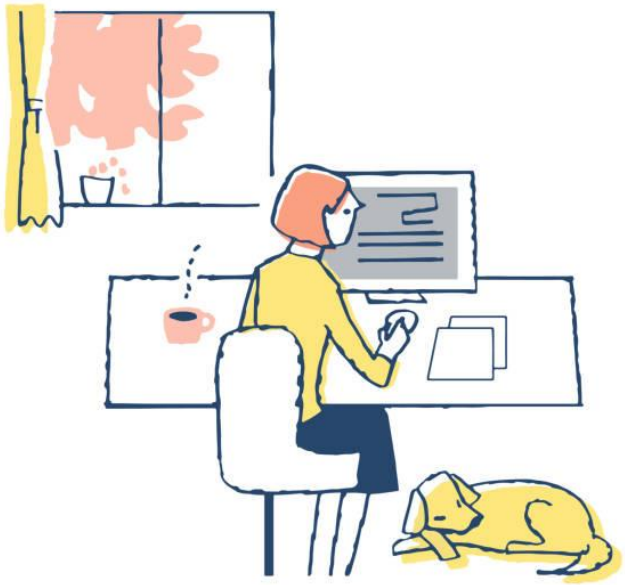






Expertise and Skills that I can offer

- Eddy Covariance techniques
- Chamber techniques
- Working from home



Expertise and Skills that would be helpful for my project

- Soil Sampling/Bulk density

hmealy@ucc.com twitter@hannahmealy

Tell us about yourself!

Name: Maria Cespedes Davalos

Research Group: CUBS | ERI

What do you like to do when you're not researching? feel free to include a photo!
Yoga, movies, books, and pets.

What is your research project about & why is it important?

My research analyses the impact of environmental regulatory compliance and beyond compliance actions on eco-innovation activities, environmental and business performance in Ireland. The methodological approach of the project uses a novel examination of the reinforcement effects between the variables to overcome endogeneity issues. The project allows the comparison between compliance and beyond compliance effects.

The importance of the study is related with the demonstration that environmental practices at industrial level can be beneficial for the public and companies. The project brings support to environmental regulations and makes policy recommendations.

Expertise and Skills that I can offer

- Technical coding skills in Excel, Stata and Python
- Economic theory
- Social science perspective on sustainability

Expertise and Skills that would be helpful for my project

- Writing skills
- Academic proof reading in English

ANJALI ASHOKAN

2nd Year PhD student
MCAG, UCC

Supervisor:
Justin D. Holmes

Project:
NXTGENWOOD

"ME" NOT AS A RESEARCHER

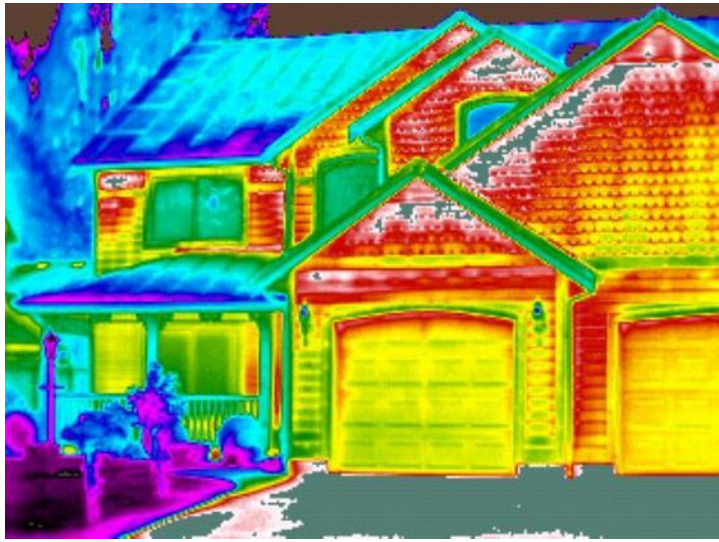
- Badminton
- Indoor games – hide & seek, shooting games
- Dance
- Spending time with my roommates

NXTGENWOOD – Waste heat to electricity

- Thermoelectric device – waste heat to electricity
- Fabrication and Optimisation of **wood-based** ionic nanofluidic harvester
- Currently working on - **EXTRACTION & FUNCTIONALIZATION OF CELLULOSE-BASED MEMBRANES**

Why?

- **70% of total energy** - lost as **heat** into the atmosphere
- An efficient TE device – most of the energy needs can be met.



EXPERTISE AND SKILLS

- **Previous Experience**

  Organic electronics - Synthesis and Characterisation of **organic molecules** for **OFETs**

  Bio-inorganic - Synthesis and Characterisation of **bio-inorganic molecules**

- **Skills**

  Synthetic chemistry

  Characterisation techniques

EXPERTISE AND SKILLS TO HELP MY PROJECT

- Extraction of natural products – Cellulose, lignin
- Functionalisation of nanoporous membranes
- Characterisation of these membranes

Thank You

Flash Presentation Session 2

Anga Hackula
PhD Student (2nd year)

Circular Economy, Energy & Environmental Systems

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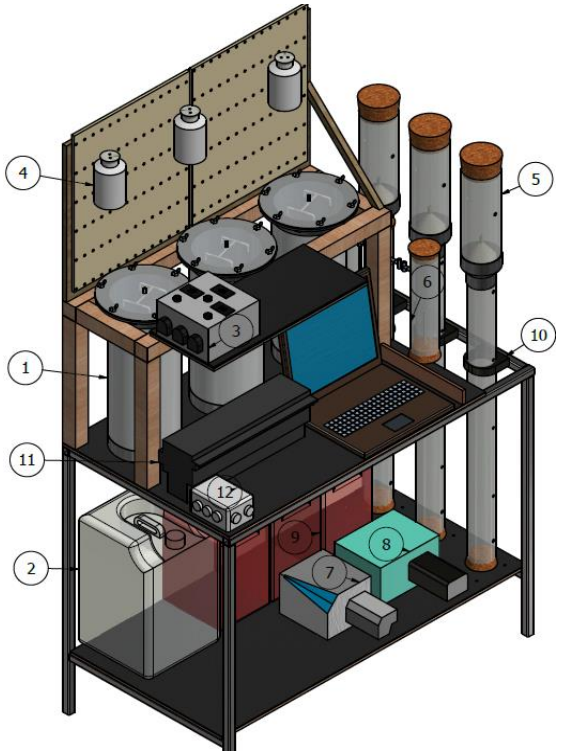
Side Hustle:

Project Context



Biogas

±75% Methane

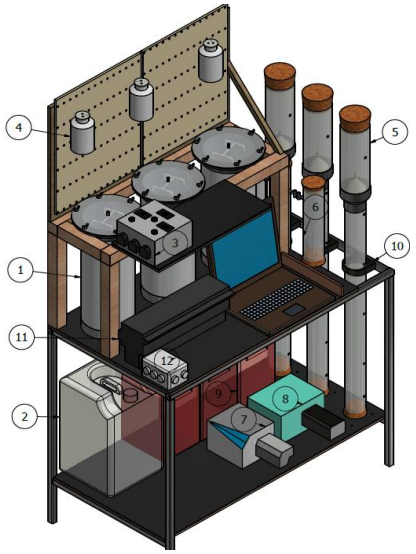
49%

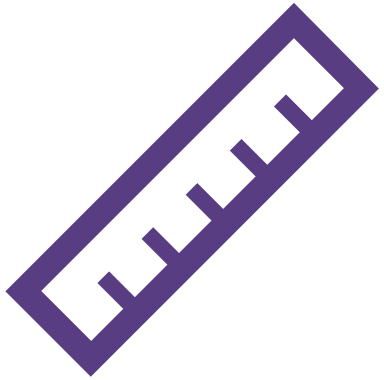
Butyric Acid

26%

Acetic Acid

Expertise and Skills that I can offer





Expertise and Skills that would be helpful for my project

- Life Cycle Analysis
- VFA extraction/separation
- Multiphase CFD simulation

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

MaREI
Energy · Climate · Marine

Environmental Research Institute

Development Of Multi-Parameter System Sensing for Environmental Monitoring

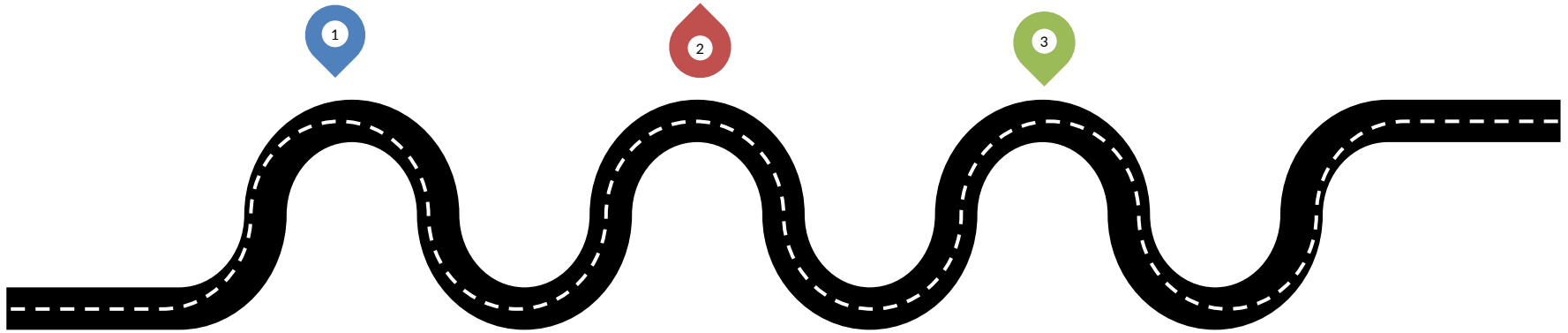
Supervisor: Dr.Eric Moore
Author: Ibtihaj Albalawi
Research Group: *Sensing and Separation Group*

Project Purpose

In situ deployment of new generation sensors.

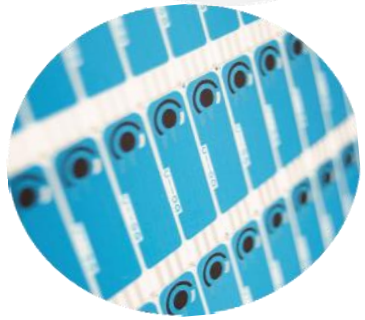
The cost associated with sampling and monitoring is reduced

simple to miniaturize and incorporate into automated systems



Project Importance

- Carbamates are hazardous to the environment and human health despite their low bioaccumulation potentials and short-term toxicity.
- Heavy metals may have devastating consequences on the ecological equilibrium and the variety of aquatic organisms
- The increasing demand for on-spot detection and point-of-care detection in environmental monitoring.
- Screen-printing technique the advantages of simple, rapid, and inexpensive



Project Skills

- I can offer good information and explanation about Electrochemical techniques, including cyclic voltammetry, stripping techniques, and pulse voltammetry.
- Skills regarding nanoparticles, including synthesizing, modification, and analysis results, as well as pre-treatment electrode surface, particularly screen printed technology.

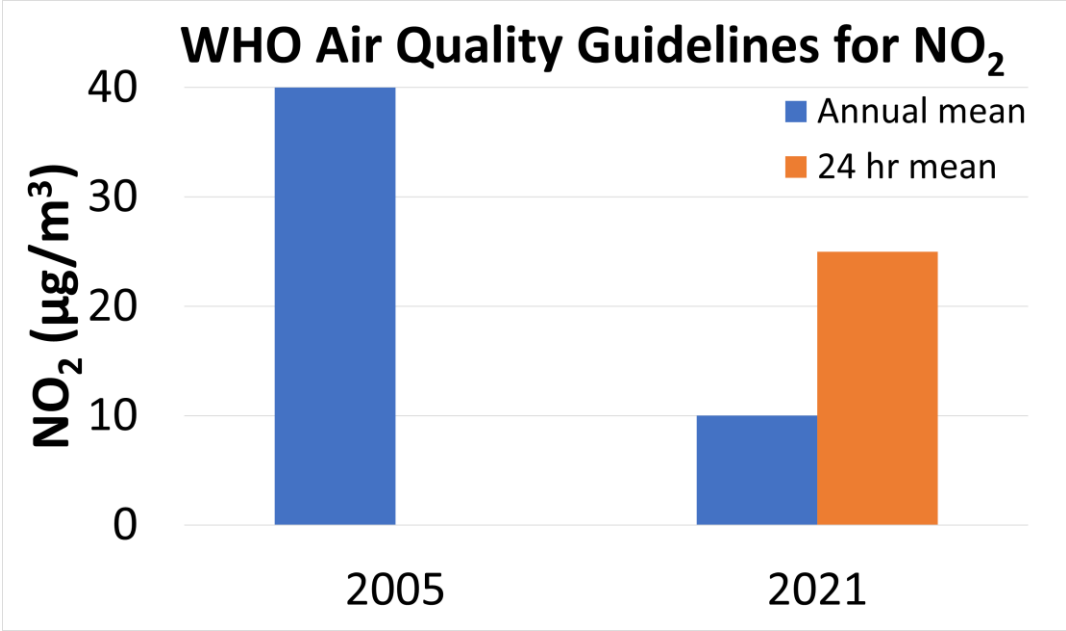
Tell us about yourself!

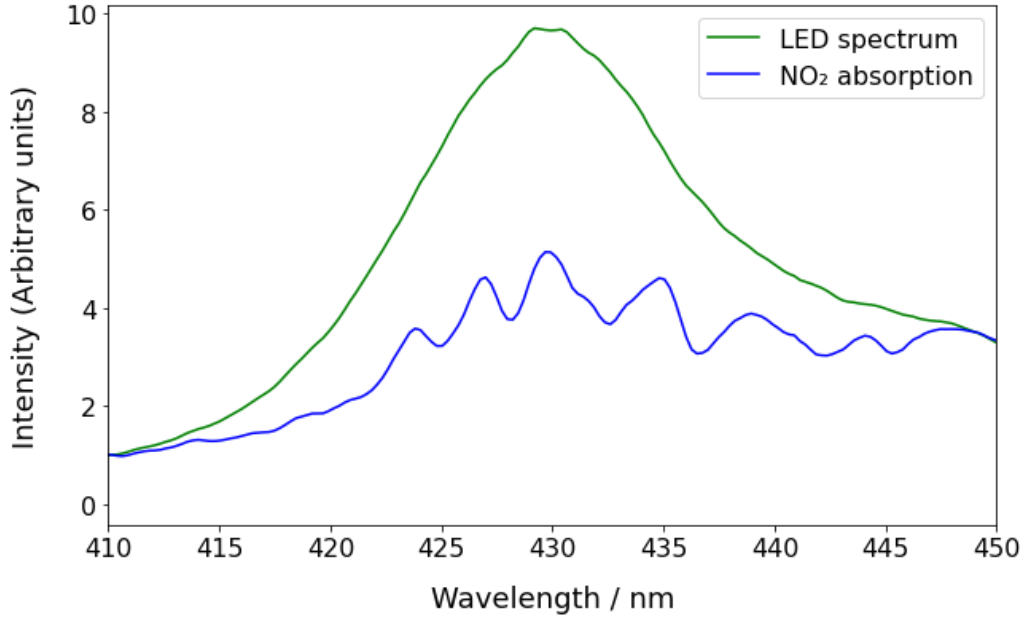
Eibhlín Halpin, 3rd year PhD
Supervisor: Dr Dean Venables
Contact: ehalpin@ucc.ie

Centre of Research into Atmospheric Chemistry (CRAC)

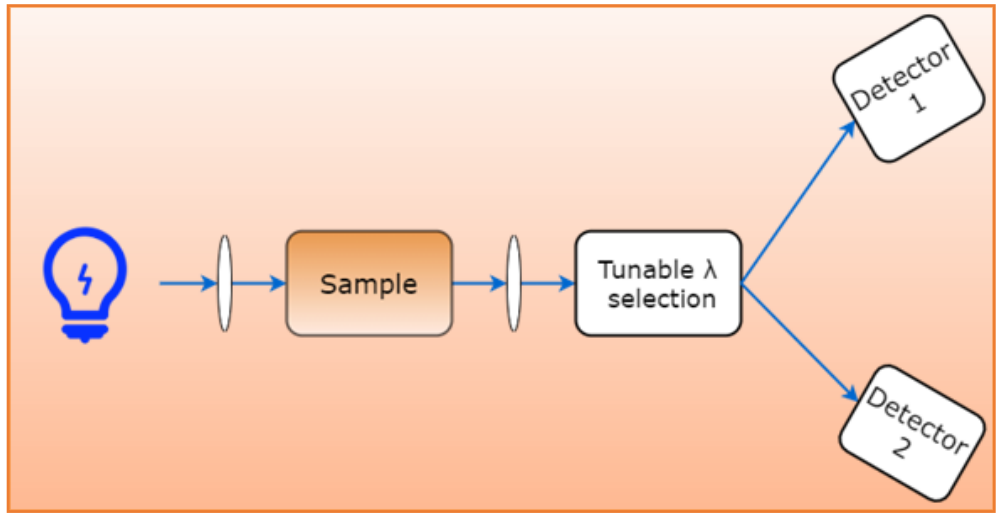
Outside of research I play music with friends and try to keep my garden alive!

What is your research project about & why is it important?





- Major source of NO_2: Burning fossil fuels – heavy traffic
- Toxic – asthma, lung cancer, respiratory and cardiovascular illnesses
- Need for a **low-cost**, **portable**, **selective** and **sensitive** NO_2 detector



Expertise and Skills that I can offer

Absorption spectroscopy methods

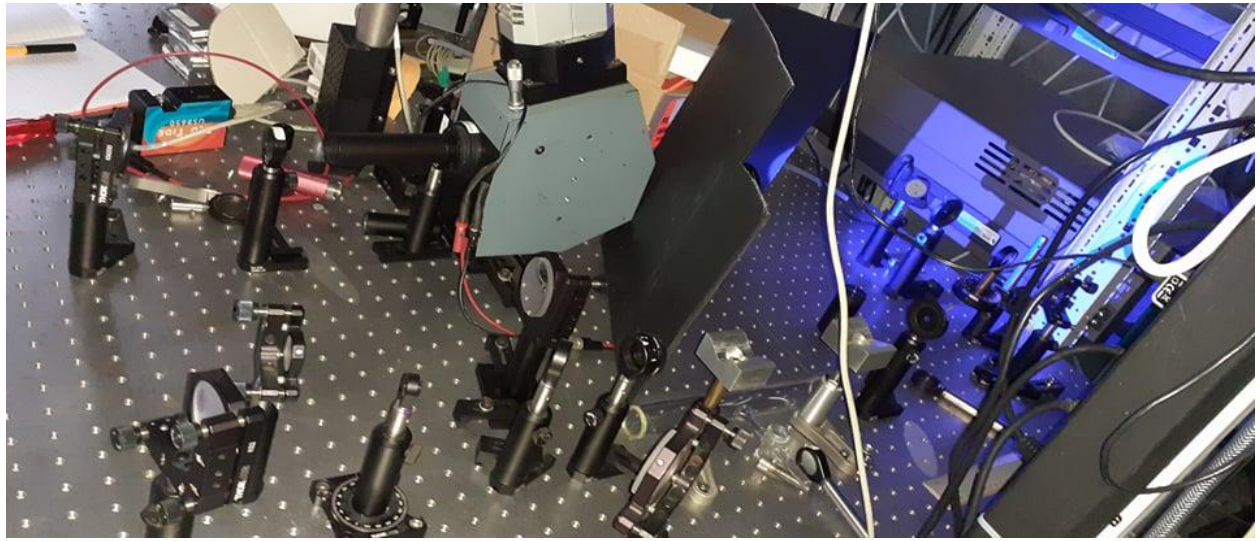
Use of atmospheric simulation chamber

Optical configurations

Expertise and Skills that would be helpful for my project

Electrical engineering for minimising systems

Signal processing



Support Tools for Community Energy –

Elizabeth Creed
UCC Department of Sociology & Criminology, MaREI

Supervisors:
Dr. Gerard Mullally
UCC Department of Sociology & Criminology, MaREI, CPPU & ERI

Dr. Niall Dunphy
UCC School of Engineering & Architecture, MaREI, CPPU & ERI

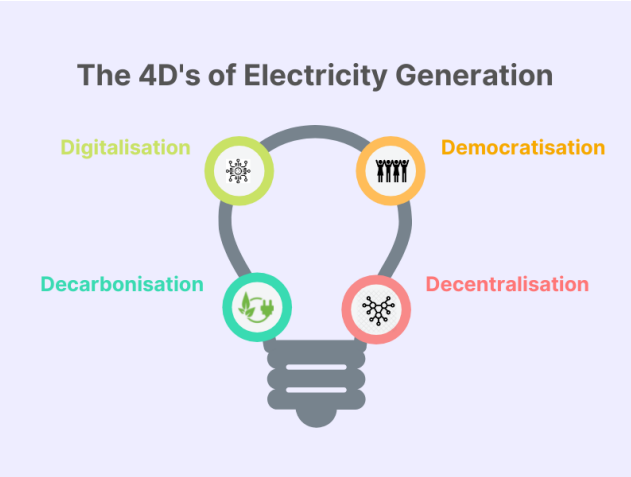
Future Kids

Future Kids +10

Energy · Climate · Marine

Coláiste na hOllscoile Corcaigh
University College Cork, Ireland

- Recognising that modernization and changes to our energy system are aligned so reflecting on our evolving energy system is critical in considering our sociological selves.
- Asking where the social innovation is happening, where it is needed.
- **CrowdPower**: the co-design of an online support tool with the ambition of 'enabling cohesion and collaboration' for the development of **community owned renewable energy projects** (CORE).



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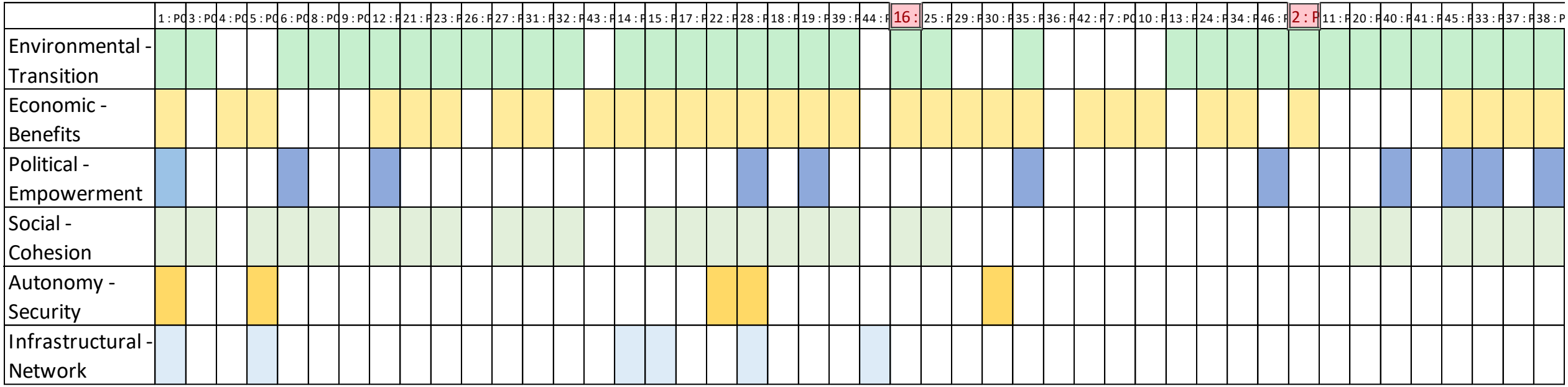
Research Context: the inertia in our energy transition

- to understand how **a more decentralised, democratized energy system** is evolving in Ireland through a sociological lens, with a focus on the role community owned renewable energy (CORE) will play in this - from strategy and innovation to policy and embedded practice, over the timeline 2004-2022.
- to record **the story of CORE** in Ireland, both where it stands in 2022 and its potential based on the endeavours that have been made across the three pillars of community, state and market to enable it.
- to gain an understanding of the inertia in our transition and an interest in '**changing the conversation' through collaborative work practices**.

"The Social Scientist's role is to make clear the elements of contemporary uneasiness and indifference."
Mills, 1959

The Role of Community Owned Renewable Energy in our Transition: **System Change through Community Empowerment (?)**



from the perspective of rural development and revitalizing rural communities who are struggling it is one of the biggest opportunities that has come along in the last two or three decades

P21/ C

What is possible?

CORE
- citizen coalitions
- collaborations
- ➢ **collective action**

Community Empowerment
- rights
- co-responsibility
- ➢ eco-values

Local Decision making
- collective impact
- ➢ care & well being

Transformational change
- shared narratives
- ➢ climate justice

*We need to democratise above – as well as below – the level of the nation….The **democratising of democracy** also depends upon the fostering of a strong civic culture. Markets cannot produce such a culture. Nor can pluralism of special interest groups. We shouldn't think of there being only two sectors of society, the state and marketplace – or the public and private. **In between is the area of civil society**, including the family and other non-economic institutions.*

Giddens, 2002

Expertise and Skills that I can offer:

Community-based research,
including co-design and co-creation

Expertise and Skills that would be helpful:

Online platform design and creation

Thank you for listening

I would like to acknowledge
the time and insight given generously by the
participants in this research
and I am very grateful for the support and
guidance received from
Dr Gerard Mullally and Dr Niall Dunphy.

Funded by

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND



Research Project: **Heterogeneous Catalysts for the Depolymerisation and Upcycling of Plastic Waste**

Group: **Materials Chemistry and Analysis Group**

Name: **Rachel Breen**

Supervisor: **Dr Gillian Collins**

Co. Supervisor: **Prof Justin Holmes**

mcag

AMBER
Advancing Materials for Impact

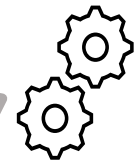
UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh | School of Chemistry

A Circular Plastics Economy

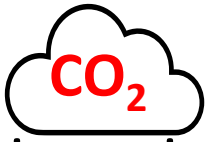
Consumer use

Post-consumer waste

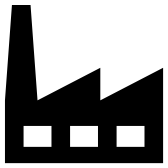
"Downcycling"



Mechanical recycling



Incineration / landfill

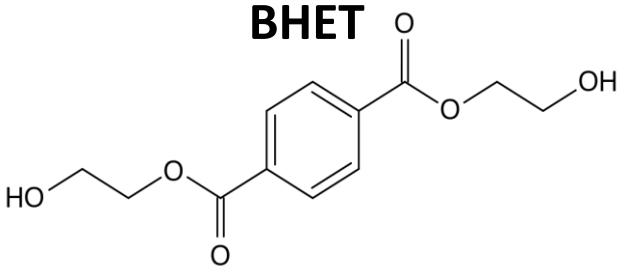


Product production

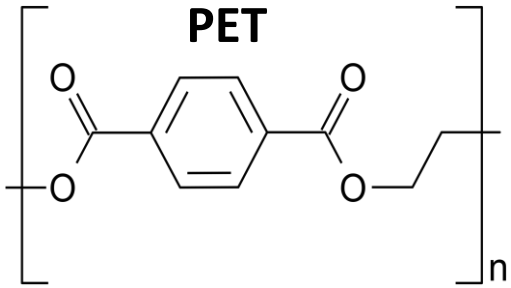
Chemical Recycling of (PET)

Closing the loop of plastic recycling

Chemical recycling - depolymerisation



Monomer production



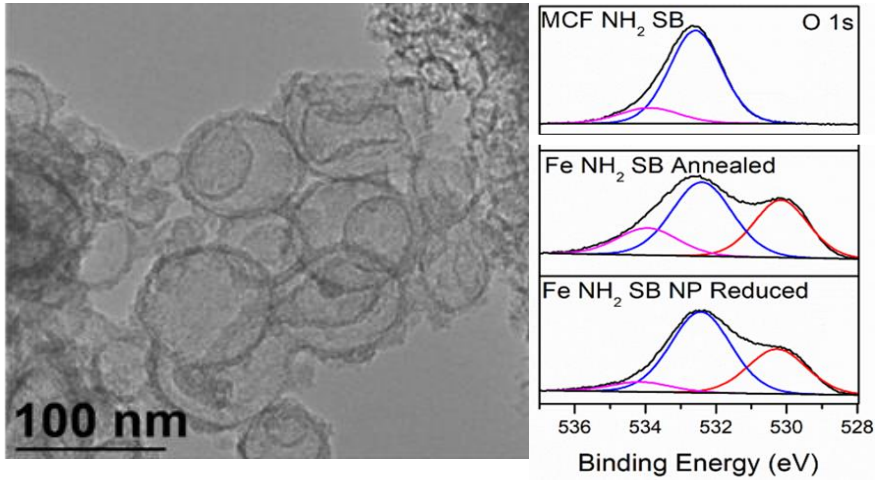
"Upcycling"

Repolymerisation/ resin production

Catalyst Design

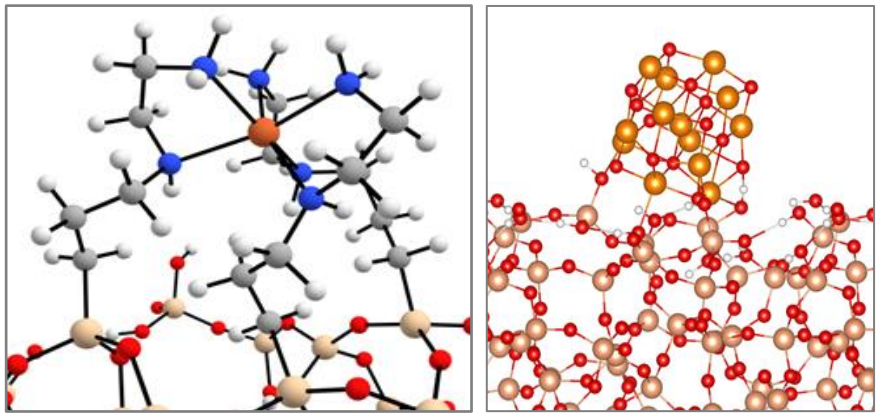
Heterogeneous catalysts

Metal Ion **Vs.** **Nanoparticle**



Nanoparticle Synthesis

Surface Characterisation



Catalyst Design

Sustainable Catalysts

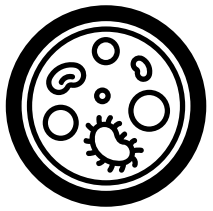
Metal Free

Energy Efficient

Useful Expertise

Biological Catalysts

- Microbial
- Enzymatic
- Fungal





Thank you

Email: **117396041@umail.ucc.ie**

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Tell us about yourself!

Name: Ankita Singh Gaur

Research Group: Energy Policy & Modelling Group, MaREI

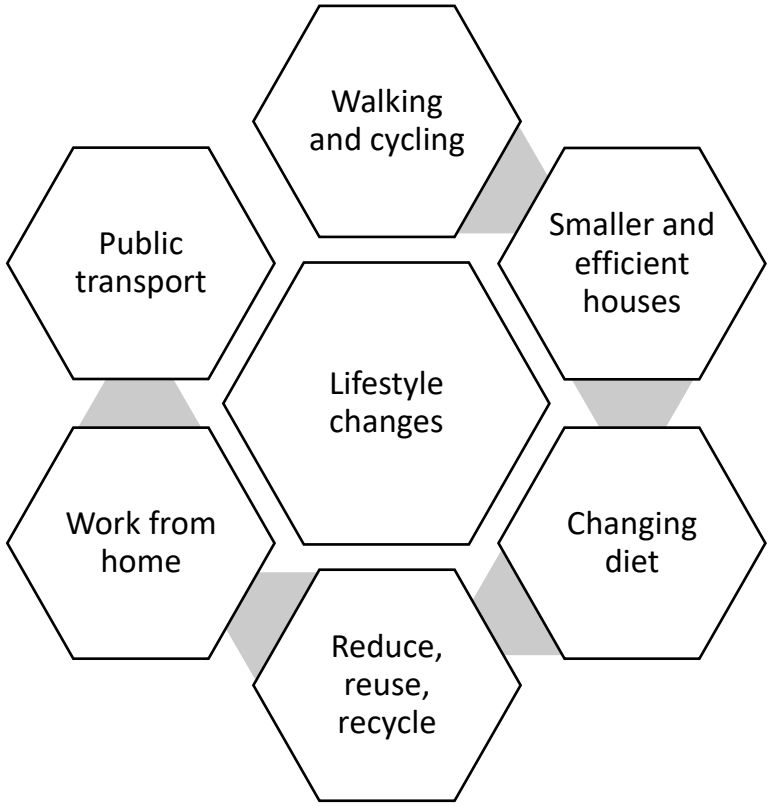
What do you like to do when you're not researching?

- Salsa Dancing

What is your research project about & why is it important?

- Modelling sustainable energy transitions for Ireland: Capturing technological, economic and social realities
  - Including macroeconomic trends and non-economic factors in energy systems modelling platform
  - Explaining the role of spatial settlement patterns on energy demand and GHG

- Our work at EPMG is extensively used in national energy-related policy making process



Expertise and Skills that I can offer

- R
- Python
- LaTeX
- QGIS

Expertise and Skills that would be helpful for my project

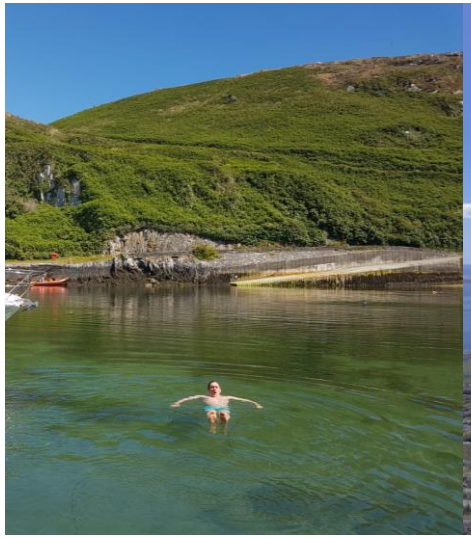
- GIT, GitHub

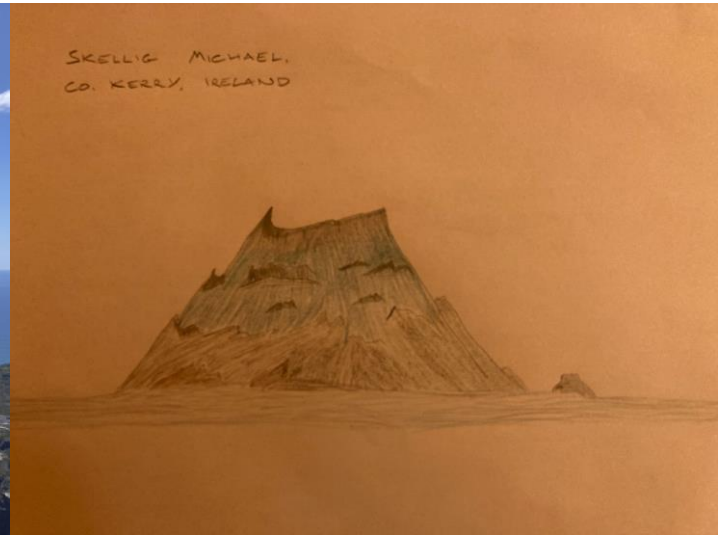
Tell us about yourself!

Name: Ross O'Connell

Research Group: ORE Group

What do you like to do when you're not researching? feel free to include a photo!





What is your research project about & why is it important?

My project focuses on the development of a Techno-Economic GIS software tool for ocean energy.

Interactive, web-based and fully open-access, it allows the user to identify suitable sites for ocean energy deployments and subsequently perform project feasibility analysis at those sites.

It will help:

- students to learn about ocean energy (academia)
- gov. departments to identify ORE zones for OREDP2 (government)
- project developers to calculate project feasibility at specific sites (industry)

It will be the first tool of its kind in marine renewable energy.

Expertise and Skills that I can offer

- Wave modelling
- Tidal modelling
- Wind modelling
- Geospatial analysis
- Techno-Economic analysis

Expertise and Skills that would be helpful for my project

- The project is almost complete but I still need to publish papers

YEASTDOC

YEAST BIOTECHNOLOGY DOCTORAL TRAINING PROGRAMME

Genetic variability and quantitative nature of multiple industrial traits identified using a new genetic mapping strategy in *Kluyveromyces marxianus*

Franziska Huff[1,2], Edward J. Louis[2], Arun S. Rajkumar[1] and John Morrissey[1]

1 UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh
School of Microbiology
Scoil na Micribhitheolaíochta

2 UNIVERSITY OF LEICESTER
GACT
Genetic Architecture of Complex Traits

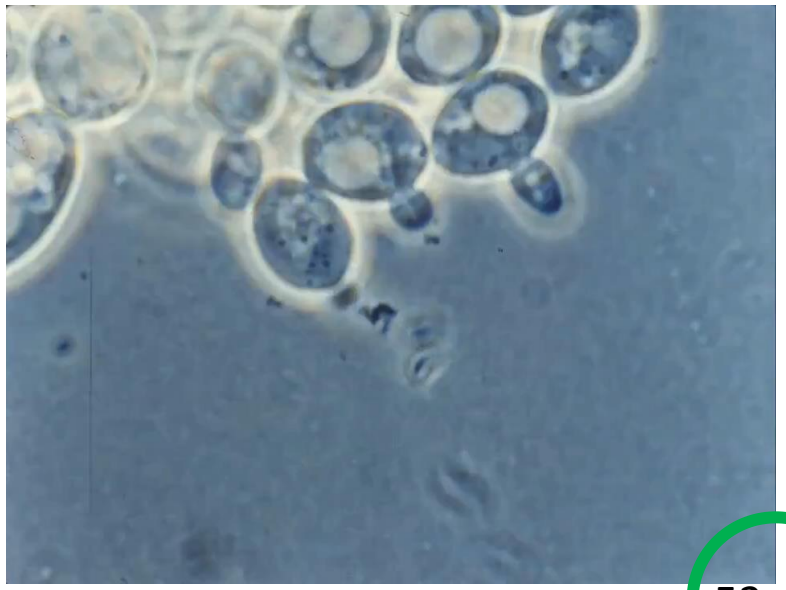
About me

- Franziska Huff
- John Morrissey – School of Microbiology
- ITN research student

YEASTDOC
YEAST BIOTECHNOLOGY DOCTORAL TRAINING PROGRAMME

K. marxianus – a yeast with exceptional industrial potential

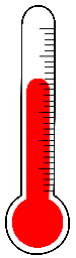
high growth rate



52min

+

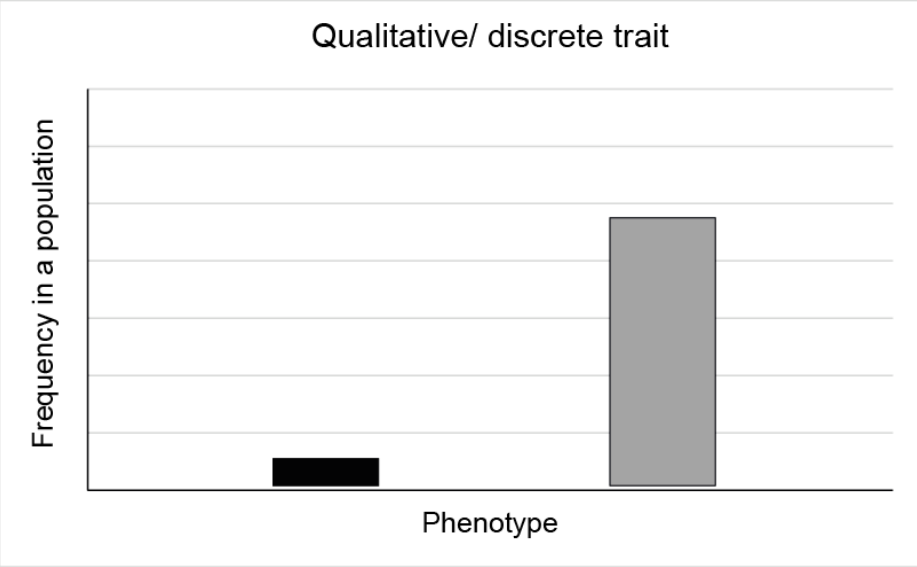
thermotolerance

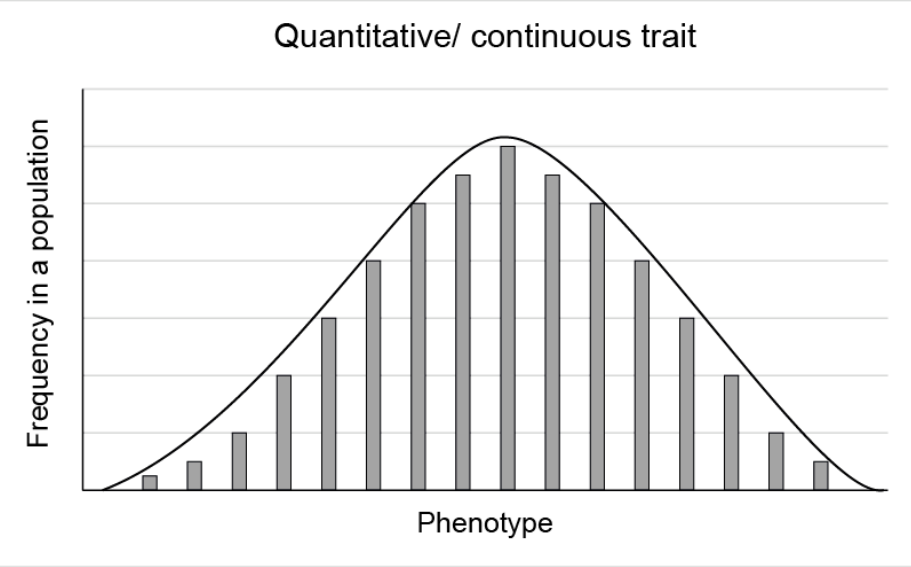


=

sustainable fermentation

What are quantitative genetic traits and how can we study them?

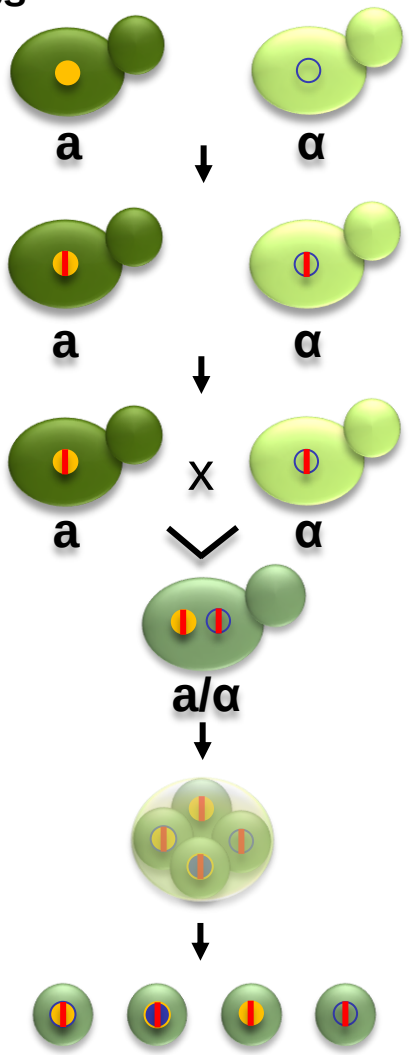




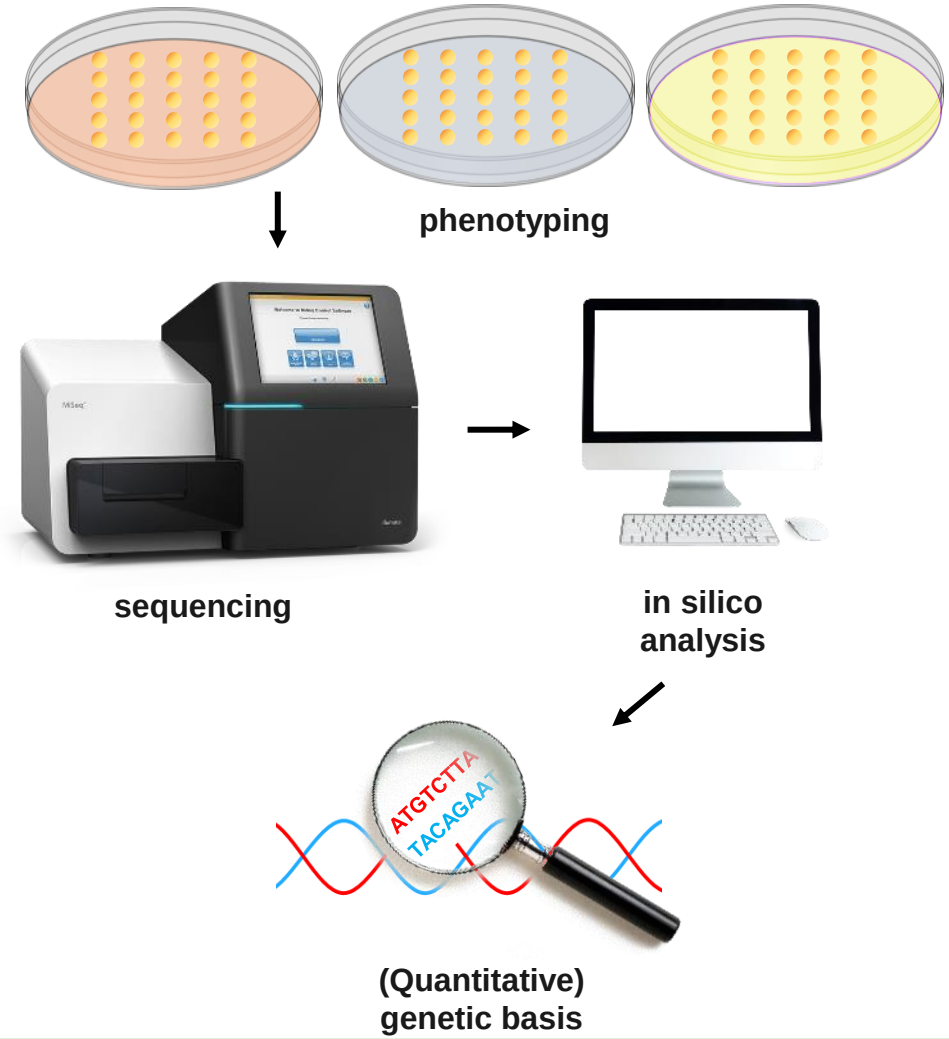
Phenotypic distribution	• Discrete	• Continuous
Genetic aspect	• Single or few genes	• Polygenic (Numerous genes)
Environmental aspect	• Little or no environmental influence	• Moderately to highly influenced by environment

Corner stones and research aims of this study

1. **Generation of a dedicated toolset to enable classical genetics**



2. **Novel genetic mapping strategy to identify quantitative traits and their genetic basis**



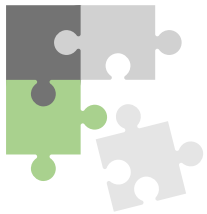
Skills I can offer

- 8 years practical “wet lab” experience
- bacterial and yeast genetics and molecular biology
- classical yeast genetics and protocols (crossing, sporulation, spore dissection etc.)

Skills helpful for my project

- Writing advice & tactis

- Always happy to learn new things and skills



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Thank you for your attention.

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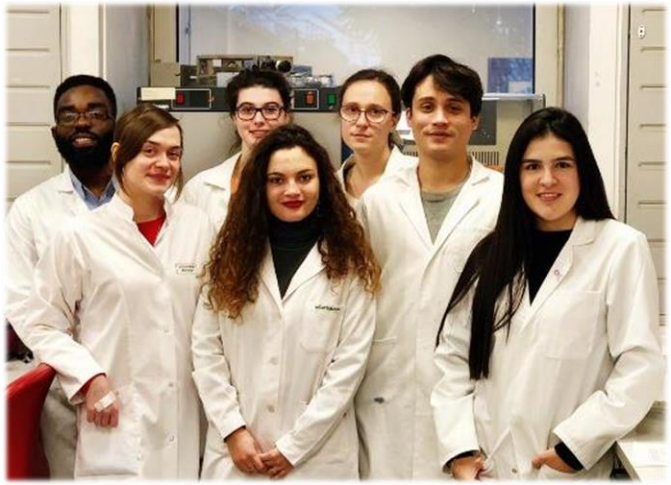


Thanks to supervisors

Dr. John Morrissey
Dr. Ed Louis

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 764927

Hannah Binner

Environmental Geochemist

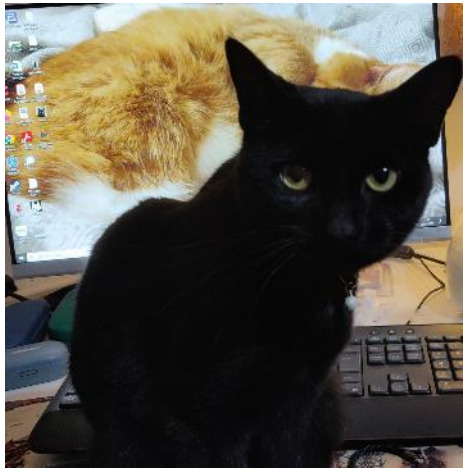
Dept. of Geology, BEES

iCRAG
SFI RESEARCH CENTRE IN APPLIED GEOSCIENCES

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

/hannah-binner-987748160

@HannahBinner

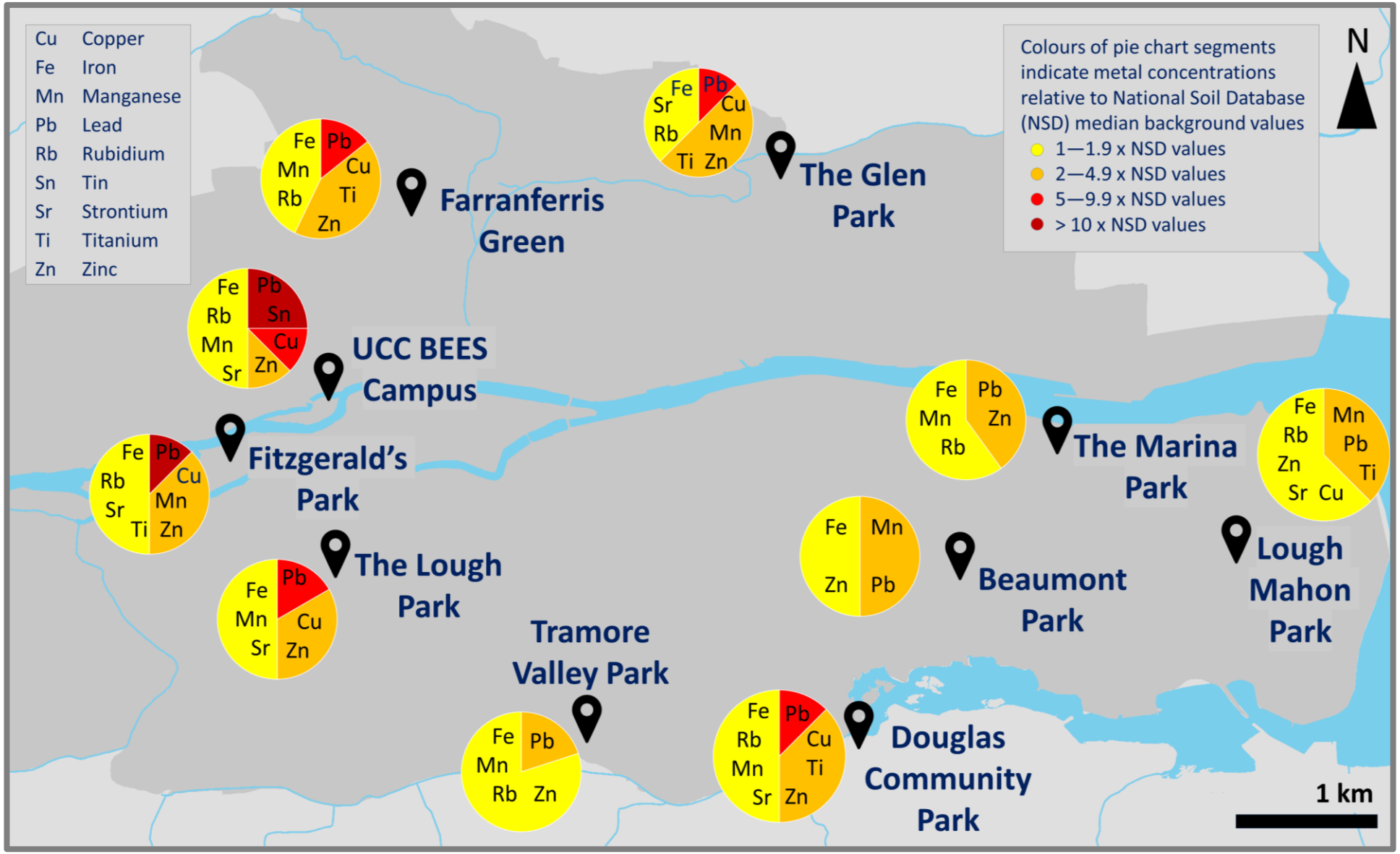


What is your research project about & why is it important?

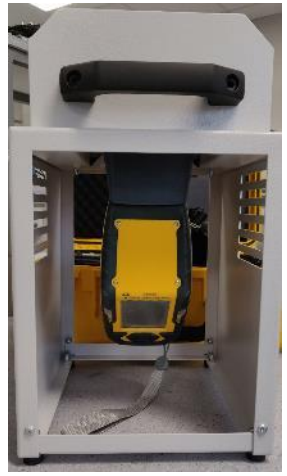
People rely on urban soils and urban green areas for their physical and mental well-being.

→ Many urban soils are contaminated
→ We have no EU and no Irish regulation to deal with these contaminated soils
→ I am gathering evidence to show the state of Irish urban soils (Cork and Wexford)

What is your research project about & why is it important?



Expertise and Skills that I can offer



Soil and water chemistry

Heavy metal research

Handheld XRF analyser

Equity, Diversity and Inclusion discussions

Geochemistry

Statistics and SPSS

Mental health advocacy

Scientific Outreach

Expertise and Skills that would be helpful for my project

Leadership and/or Project management

Tips to help me write papers faster!!!

A platform to discuss methods and approaches

R statistics cheats

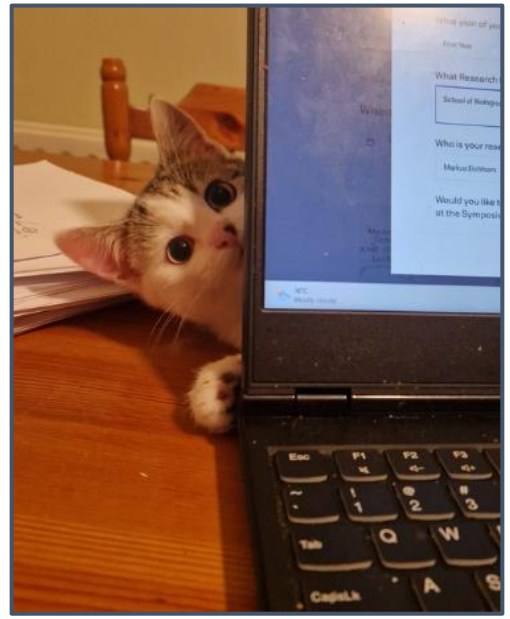
Katerina Chernyuk

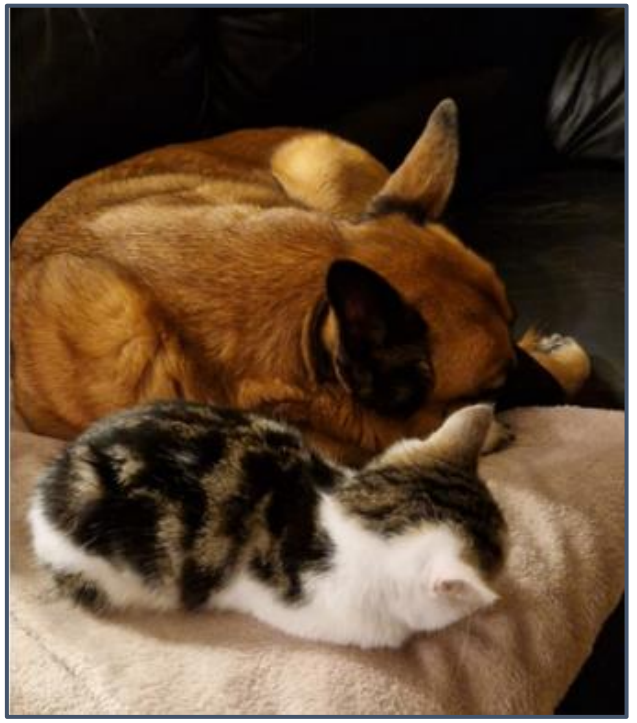
PhD student

Biological, Earth and Env Sciences

(BEES)

Interests:
Family, friends, travelling
and then reading, Netflix etc
Hobbies:
Skiing, horseriding

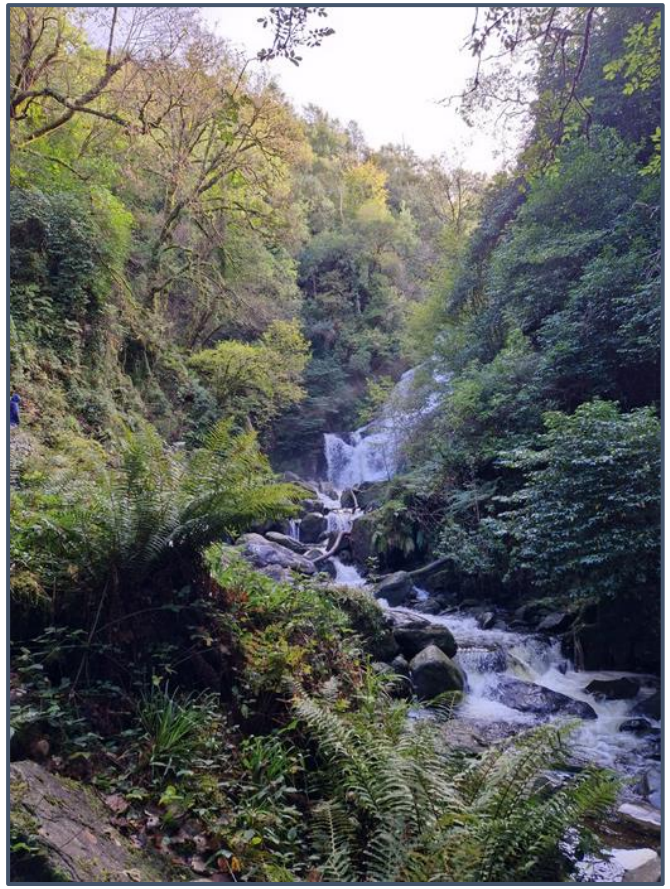




Photos by Katerina Chernyuk 2022

Restoring Atlantic Oakwoods - Strategies and Perceptions

- Temperate rainforest
- Ancient woodland
- Bryophytes, ferns lichen
- Rare and irreplaceable
- Endangered



Photos by Katerina Chernyuk 2022
Killarney National Park

Expertise and Skills that I can offer

- R studio
- Ecology/ environmental theory
- Basic GIS skills

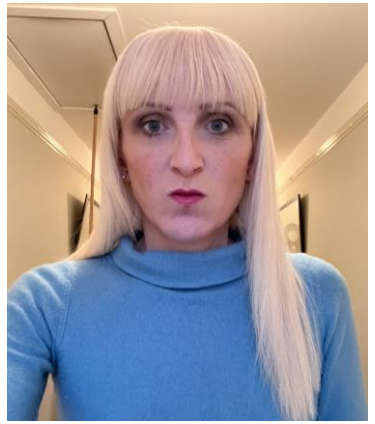
Expertise and Skills that would be helpful for my project

- Locations of Atlantic oakwood sites
- Advanced Mapping

Photo by Katerina Chernyuk 2022

Amy O'Halloran

Centre for Law and the Environment at the School of Law, UCC



Project: ***Private Transnational Environmental Regulation and Systemic Interactions in Global Environmental Governance***

This research is funded by the Irish Research Council and the Environmental Protection Agency under award number (GOIPG/2020/1409).

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An Chomhairle um Thaighde in Éirinn

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Identifying pressures • Informing policy • Developing solutions

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University College Cork, Ireland

Transnational Environmental Regulation and determining whether it is a type of *Legal Order*

What is Transnational Regulation?

- Regulation which extends *beyond* or *across* national jurisdictions (e.g. supply chains, finance etc.)
- Governs transnational activities relating to matters such as production, supply chains, value chains and finance
- Mostly (*but not exclusively*) regulates private actors involved in production and distribution.
- Mission Statements tend to be orientated towards *inter alia* public interest objectives (e.g. sustainable environmental practices).
- Adoption of transnational regulation is usually voluntary, but in practice it may be a prerequisite to accessing certain markets

Selected Examples of Transnational Regulators

- International Organization for Standardization (ISO)
- Forest Stewardship Council (FSC)
- Marine Stewardship Council (MSC)
- Alliance for Water Stewardship (AWS)
- Roundtable on Sustainable Palm Oil (RSPO)

Expertise

My expertise primarily relates to theoretical and functional aspects of transnational environmental law, global law, and legal pluralism.

Relation to Other Disciplines

My research overlaps with certain aspects of global governance in the discipline of International Relations, processes of globalisation in the discipline of Sociology, and polycentric governance in the discipline of Political Economy etc.

Contact

Email - amy.c.ohalloran@umail.ucc.ie

Mastodon - @amyohalloran@bhre.social

@AmyOHalloran@mastodon.lawprofs.org

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

MaREI
Energy · Climate · Marine

Environmental Research Institute

ERI Postgraduate Research Symposium

Name: Quang Vu Dinh

PhD in the H-Wind project

Email: qvudinh@ucc.ie

25th Nov 2022

Project: **H-Wind**

The H-Wind project studies green hydrogen production from offshore wind farms.

Team: Dr Paul Leahy, Dr Nguyen Dinh

PhD student: Quang Vu Dinh, Hadi Mosadeghi

For more information: https://www.marei.ie/project/h-wind/

25th Nov 2022

Mapping LCOH for hydrogen production from offshore wind in Ireland

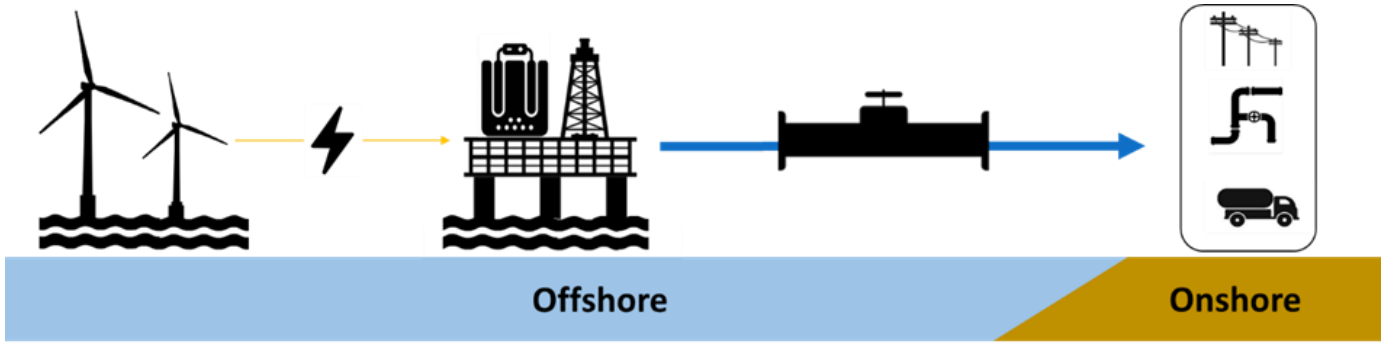
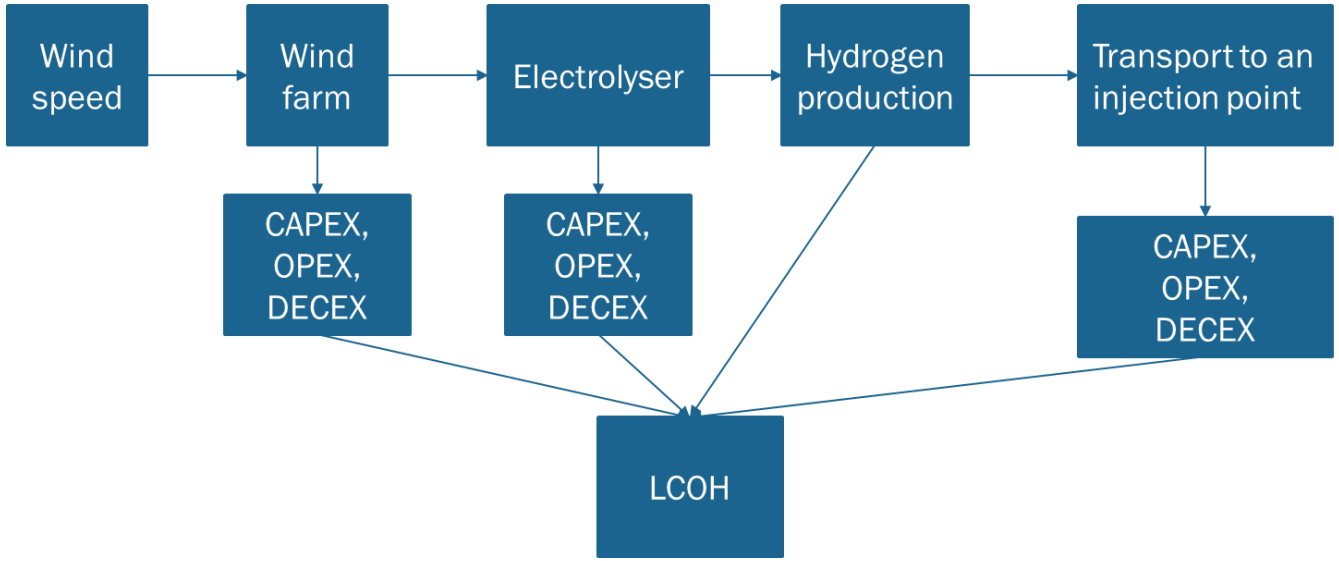


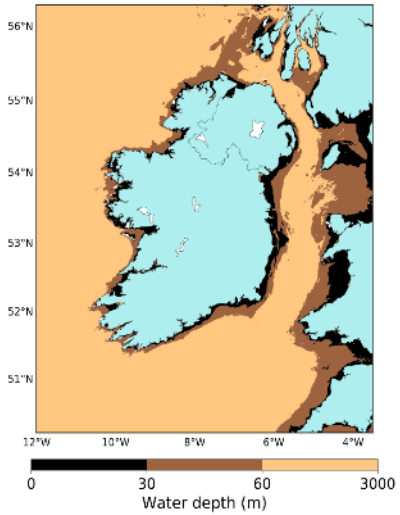
Figure 1. Model of hydrogen production with fully dedicated production from an offshore wind farm

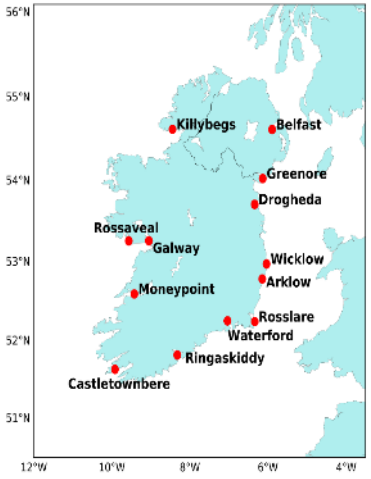


$$LCOH(x,y) = \frac{CAPEX(x,y)+OPEX(x,y)+DECEX(x,y)}{Hydrogen\ Production(x,y)}$$

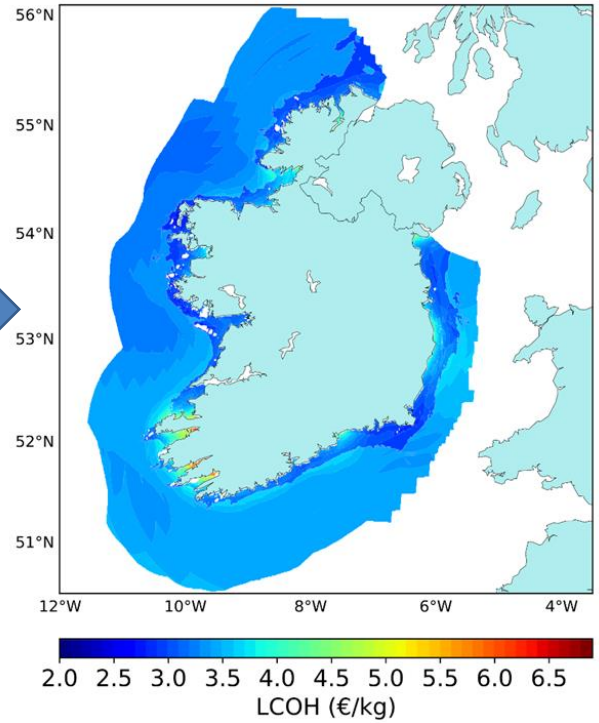
25th Nov 2022

Mapping LCOH for hydrogen production from offshore wind in Ireland





No.	Injection point
1	Dublin
2	Wexford
3	Waterford
4	Cork
5	Limerick
6	Galway
7	Bellanaboy
8	Derry
9	Gormanston



Locations of potential ports and injection point

Expertise and Skills that I can offer

- Using Python for Mapping

Expertise and Skills that would be helpful for my project

- Optimization, Deep learning, Machine learning
- Market model

25th Nov 2022

Techno-economic analysis of on-farm anaerobic digestion systems.

Presenters: Jorge Diaz Huerta

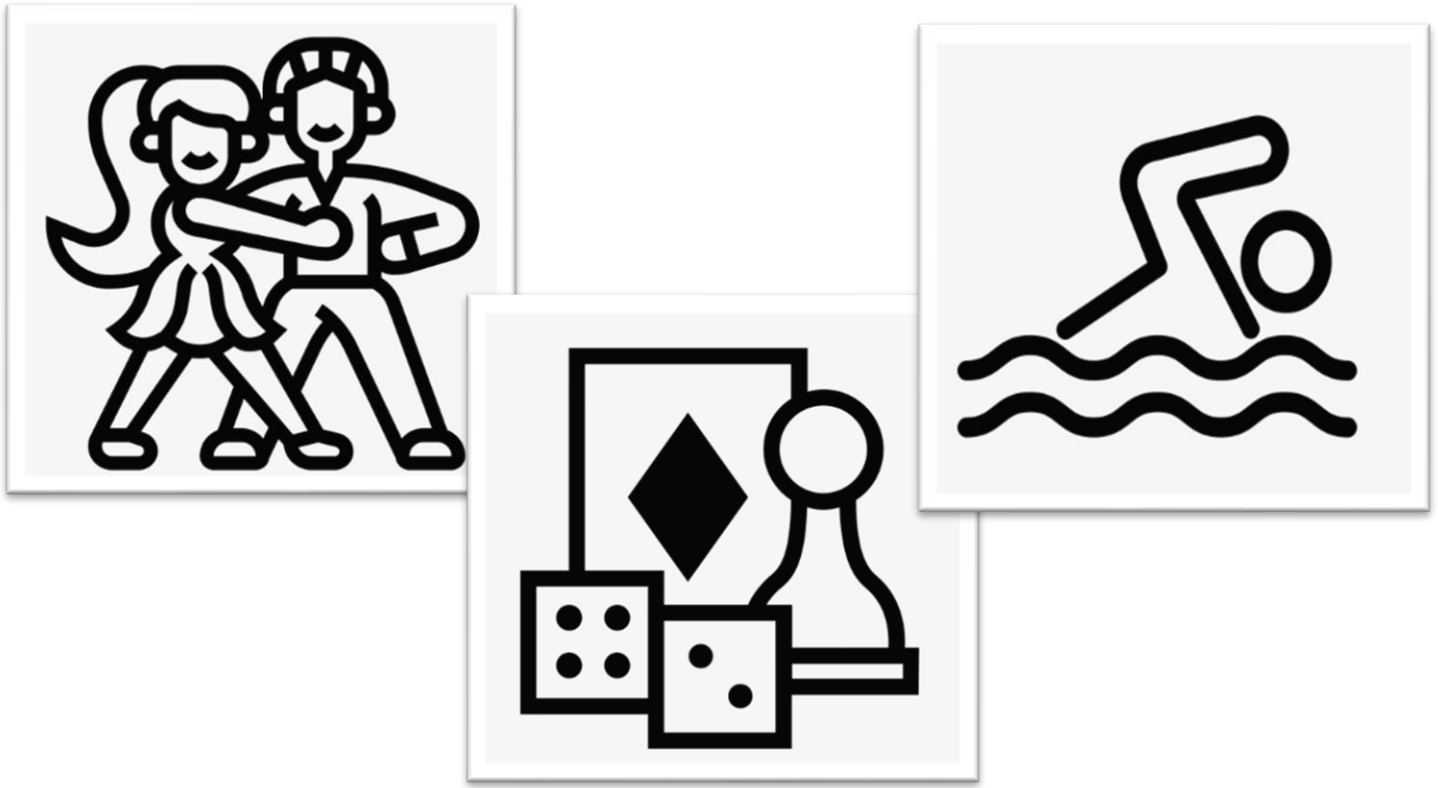
Group : Circular Economy, Energy, and Environmental System Research Group

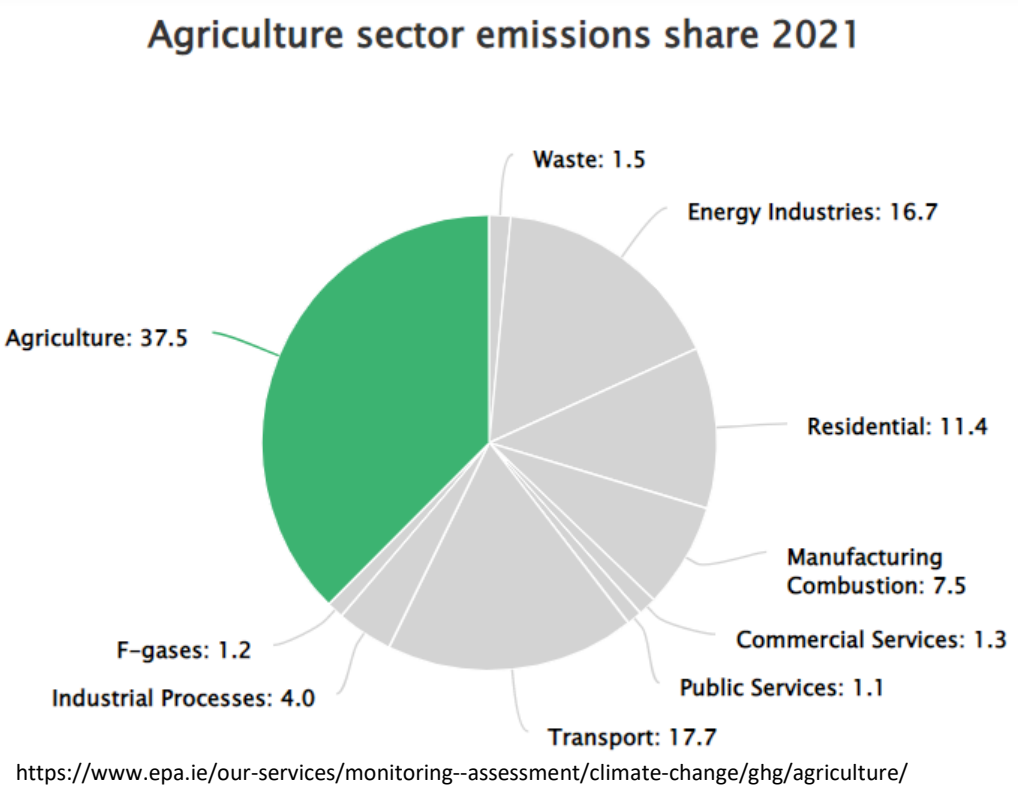
Jorge Diaz Huerta

Circular Economy, Energy & Environmental Systems

EcoAD

Developing Economic solutions for on-farm Anaerobic Digestion technologies under Irish conditions





https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/agriculture/

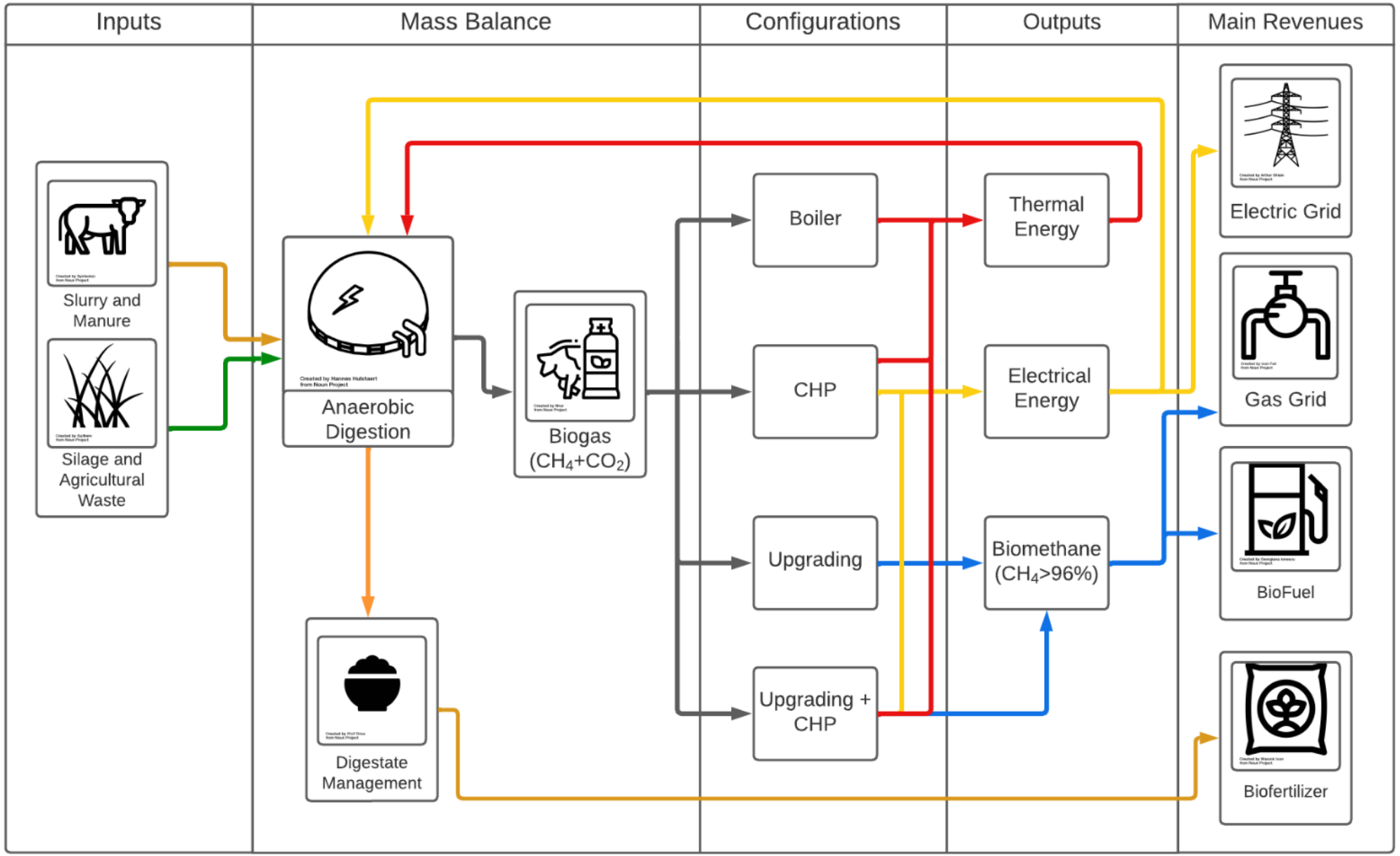
- Development of TEA tool to assess feasibility of on-farm AD systems in Ireland.

Plans for 130 large scale agricultural anaerobic digestion plants by 2030

Plans have been outlined to build 130 anaerobic digestion (AD) biomethane plants in rural Ireland by 2030. M embers of the Renewable Gas Forum Ireland (RGFI) outlined today that they have an ...

www.independent.ie

Diagram Flow of TEA Tool



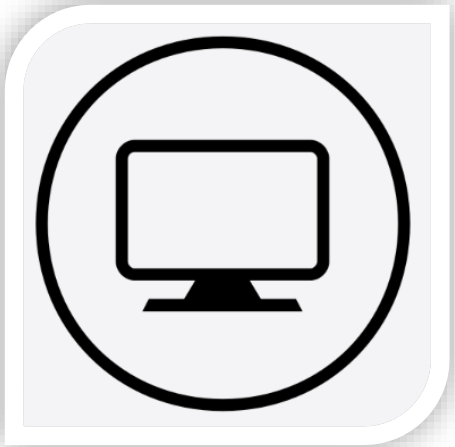
Expertise and Skills that I can offer

Techno-Economic Analysis

Life-Cycle Analysis

Marginal Abatement Cost Curves

Expertise and Skills that would be helpful for my project



Programming Skills

Outreach Communication

MaREI
Energy · Climate · Marine

Thank you

jdiaz@ucc.ie

Environmental Research Institute

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

EcoAD
Developing Economic solutions for on-farm Anaerobic Digestion technologies under Irish conditions

Gas Networks Ireland

Environmental Research Institute

Postgraduate Research Symposium

25th Nov | 9am-1pm | Dora Allman Room | Student Hub, Main Campus

Darragh Murphy

4th Year PhD Student

SloWaters Project

Not research: Hiking

darragh.murphy@ucc.ie

nwrmireland.wordpress.com

UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh

epa Environmental Protection Agency

OPW

Teagasc Agriculture and Food Development Authority

SloWaterS

Environmental Research Institute

Postgraduate R
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epa
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Agriculture and Food Development Authority

SloWaters

What is your research project about & why is it important?

NbCMS – Nature-based Catchment Management Solutions

- Flood management (in-stream and offline flood storage)

- Water quality (sediment attenuation & enhancing contact with soil & streambed microbes)

- Natural processes & materials to reinstate & enhance attenuation capacity of agricultural catchments

- Working with landowners:
  Soil, grass, water

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- Working with landowners:
  Soil, grass, water

Expertise and Skills that I can offer

- Stream Hydrology
  - Stream characterisation
  - Tracer studies
  - Hydrological modelling
- Water quality, flooding & farming info
- Moving rocks around

Expertise and Skills that would be helpful for my project

- Statistical analysis
- Writing

The MISTRAL project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie actions grant agreement No 813837
The views and opinions expressed in outputs from this project are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission

Answers in the wind

Julia le Maitre

Project Co-Wind
CUBS & ERI
Finance & Economics

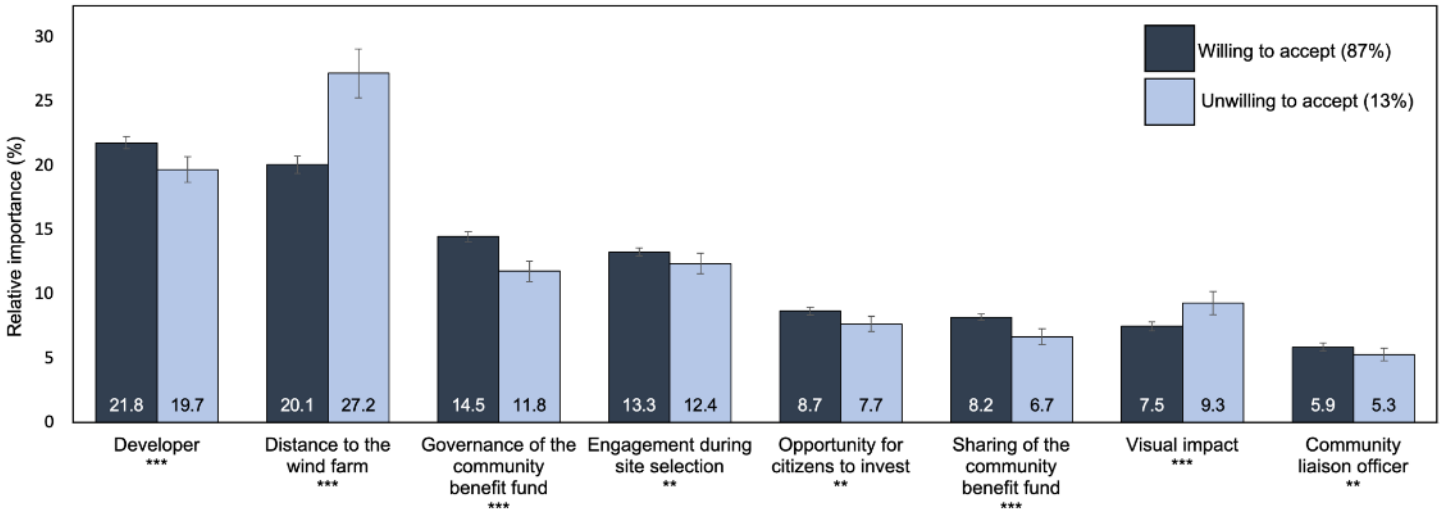
Hobbies?
Climbing to heights!

What's the deal about financial benefits & wind farms?

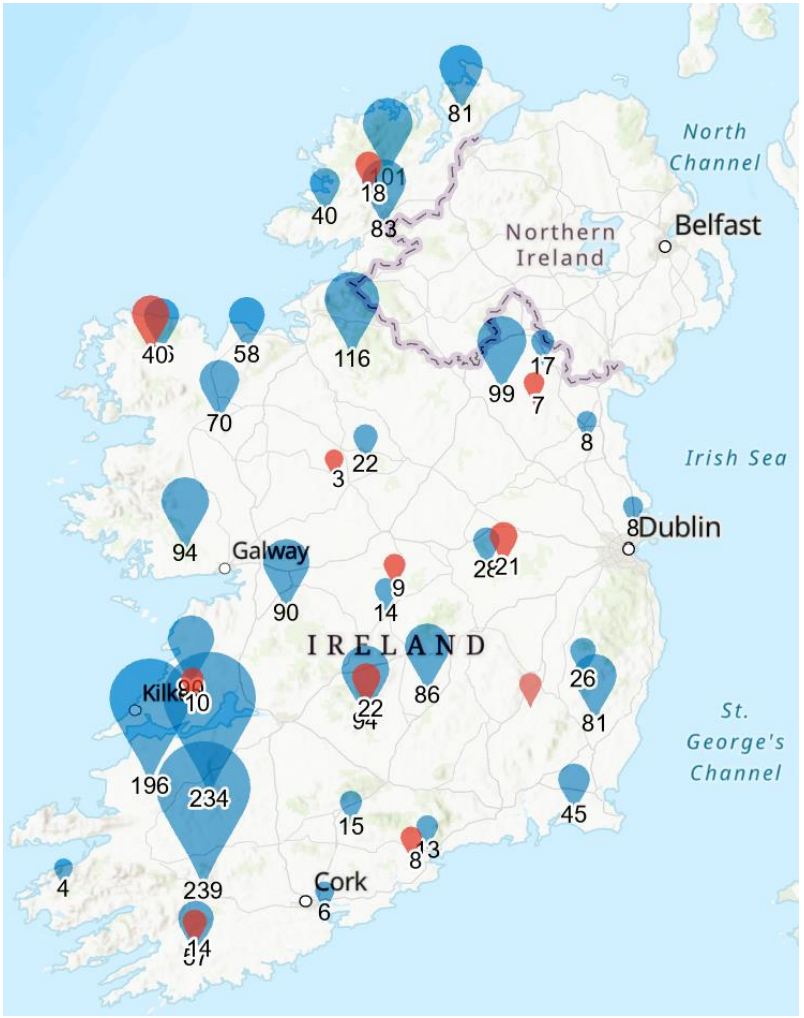
Wind-rich areas tend to be rural and **neighbouring a wind farm** will become an increasingly common experience. Low-population, high-potential areas are expected to add 6000 GW worldwide by 2030 (IEA, 2021).

Distributive and procedural justice for nearby residents is essential for an **energy transition that is fast and fair** (Clausen & Rudolph, 2020).

My research considers the **necessary trade-offs** between financial, procedural and project impact factors associated with wind energy development in Ireland.



Relative importance of attributes by dual-response choice-based conjoint analysis (n=1,014)



Distribution of onshore wind farms in Ireland (SEAI, 2022)

How I spend my time

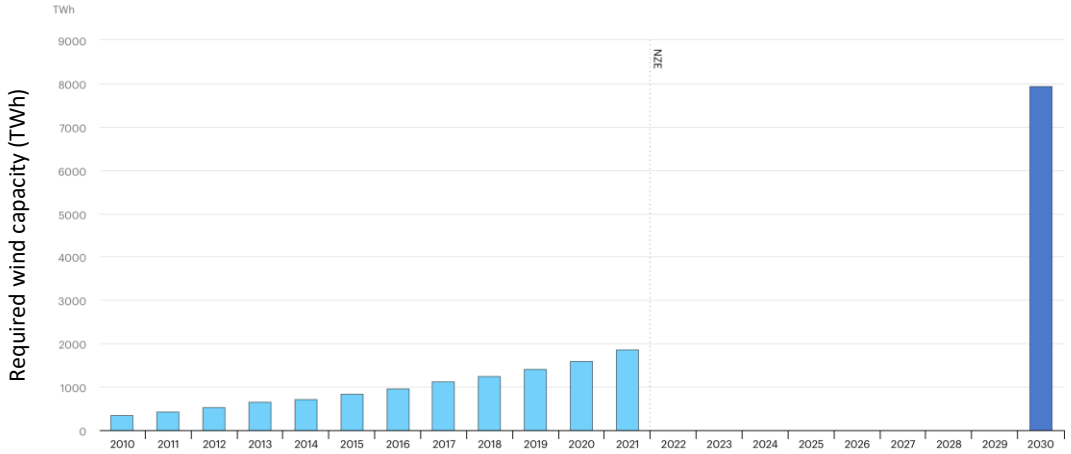
My work is largely interdisciplinary. The majority of my focus spans behavioural economics in the context of energy justice, financial incentives and stakeholder engagement:
Writing papers!
Choice experiments (HB/DR-CBC)
Survey analysis, data handling, ocus groups, interviews
Writing and synthesizing policy outputs (Writing!!)
Attending workshops, presenting at conferences
Collaborating with overseas research groups (Did I mention writing?)

Financial co-investment authors hard at work

Helpful expertise and skills

In the future I'd hope to examine regional macroeconomic benefits calling for strong GIS (Geographical Information Systems) expertise.

This research would also benefit from other disciplinary input:
Infrastructure Planning
Energy Geography
Ethics and Political Science
Change Management
Mechanical / Civil Engineering
Economics / Finance



Getting to net zero calls for involvement across all disciplines (IEA, 2022)

Its me RUPA!

Home land to dream land

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

mcag

Prof. Justin D. Holmes

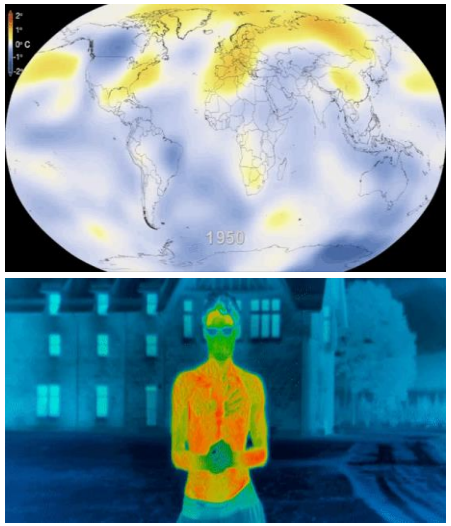
Teach..!

Enjoy Food..!

Explore..!

Fashion..!

TRANSLATE – Conversion of Waste Heat Energy into Electricity

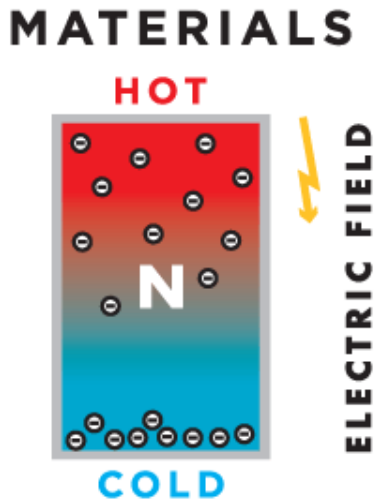


Waste Heat

Conversion

Electricity

By the means of..



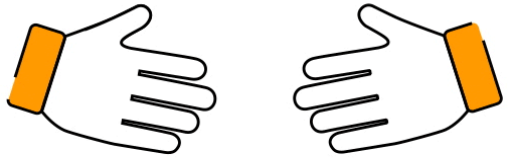
Thermogalvanic cell

Dr. Kafil M. Razeeb

TRANSLATE TEAM

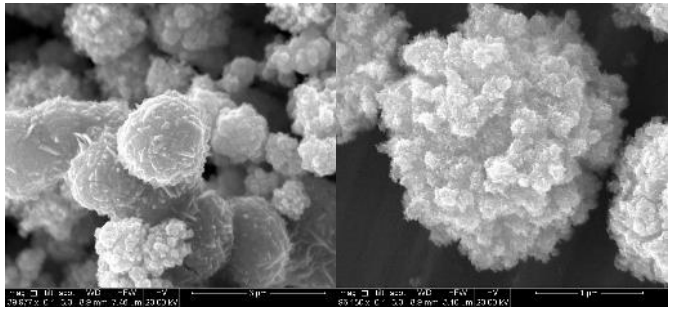
Dr. Subhajit Biswas

Nanoscience and Electrochemistry

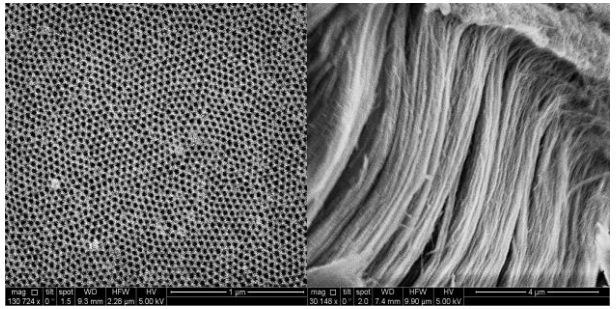


Team of Principal Scientist
Dr. R.B. Rakhi, CSIR, India

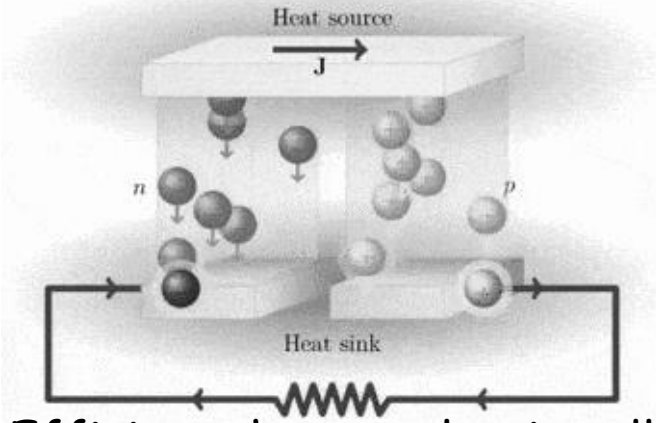
Current Work….



Electrode materials



Porous Anodized Aluminium oxide (AAO) membranes



Efficient thermogalvanic cell

THANK YOU!