

# Irish Bioenergy Association

**Biochar and Biobased Filtration  
Addressing water quality and excess nutrients.**

Lough Carra Catchment Association

5<sup>th</sup> October 2021



# About the Irish Bioenergy Association (IrBEA)

- ESTABLISHED IN 1999
- REPRESENTATIVE VOICE FOR THE IRISH BIOENERGY INDUSTRY ON THE ISLAND OF IRELAND, WORKING ON BEHALF OF:
  - BIOMASS, BIOGAS, BIOFUELS, BIOCHAR, WOODFUELS & ENERGY CROP SECTORS.
  - POLICY, LOBBYING & ADVOCACY, KNOWLEDGE TRANSFER.
  - BROAD AND DIVERSE MEMBERSHIP INCLUDING: FARMERS, FORESTERS, SMEs, TECHNOLOGY PROVIDERS, CONSULTANTS, SEMI STATE ORGs FUEL SUPPLIERS, ACADEMIC BODIES, FINANCIAL INSTITUTIONS ETC.
  - CURRENT PROJECTS: WFQA, EIP SBDP, THREE C
    - FIND OUT MORE AT [WWW.IRBEA.ORG](http://WWW.IRBEA.ORG)



## What is biochar?

- Black, solid, high carbon content material
- Highly porous
- Large surface area
- Recalcitrant(stable)
- Made from a variety of biomass streams
- Formed during pyrolysis
- Variable in shape and size

## Where is it used?

- Water Quality/Treatment/Remediation
- Use within the agricultural community
- Use within the forestry and composting sector
- Use within the horticulture sector
- Voluntary Carbon Removal/Offset Markets
- Bio-based Materials
- Carbon Sequestration

# Interreg NWE THREE C Project- Creating the Circular Carbon Economy



- Transnational project looking at enabling the development of biochar based products and services.
- Focus on Integrated Biomass and Carbon Management (IBCM)
- Roll out of CC –Hubs , CC- Labs & CC- Net
- THREE C Professional Development Course underway

- For more information, visit [www.threec.eu](http://www.threec.eu)
- or contact [stephenmccormack@irbea.org](mailto:stephenmccormack@irbea.org)



# IrBEA Members involved in the Biochar Space

## Companies

- Greenbelt Biochar
- Arigna Biofuels
- Origin Biochar
- Heatsystems Ltd.
- WOODCO
- Celignis Analytical
- Probiocarbon

## Sectors

- Bulk biochar producers
- Technology providers
- Biochar analytics
- Biochar product developers
- Microbiology
- Biochar R & D
- Activated Carbon Specialist

# Biochar Based Filtration

- Biochar has been shown to act as a useful and effective filtration medium due to its physical and chemical properties.
- Innovative approaches using biochar-based filters in other countries have shown success in the remediation of water bodies in a manner that can be considered passive and relatively low tech.
- Companies involved in restoration and remediation of water bodies have used biochar-based filtration media to reduce not only excess nutrients but also heavy metals and other pollutants.\*
- \* <https://www.youtube.com/watch?v=USbS-vl9Z8>

# Biochar Based Filtration for surface water remediation(nutrient reduction)

- Deployment of the bio-based filters at differing locations surrounding a pilot site.
- 2-pronged approach- filters for use within the water body itself and filters that will be used within drainage ditches at farm level that drain into the surface water body.
- Ideally, baseline water quality data will be available for deployment sites.
- Sites should be chosen based on guidance from relevant authorities and experts.

# Examples of Nutrient Reduction from other countries(using biochar as an adsorbent)

<b>Company Name</b>	<b>Weblink</b>
Biochar Now LLC	<a href="https://biocharnow.com/algae-removal/">https://biocharnow.com/algae-removal/</a>
ACER Environmental LLC	<a href="https://www.youtube.com/watch?v= USbS-vl9Z8">https://www.youtube.com/watch?v= USbS-vl9Z8</a>
Solitude lake management	<a href="https://www.solitudelakemanagement.com/blog/biochar-natural-solution-safely-filter-excess-nutrients/">https://www.solitudelakemanagement.com/blog/biochar-natural-solution-safely-filter-excess-nutrients/</a>
PrincetonHydro	<a href="https://princetonhydro.com/biochar/">https://princetonhydro.com/biochar/</a>
Glanris	<a href="https://www.glanris.com/">https://www.glanris.com/</a>
Stormwater Biochar	<a href="http://www.stormh20bmp.com/filter-booms--socks.html">http://www.stormh20bmp.com/filter-booms--socks.html</a>
Filtrex Pollutant Filters	<a href="https://www.filtrex.com/en/applications/pollutant-removal">https://www.filtrex.com/en/applications/pollutant-removal</a>



## Possible steps for pilot trial

- Work with local landowners & ecologists to identify sites for intervention.
- Work with biochar producers to trial available Irish biochar.
- Procure and design biochar filters, socks & booms.
- Filter casing material needs to be permeable & robust. Potential to use natural fibre material(hessian, jute, coir etc) or synthetic (silt socks, plastic based).
- Assembly of filters( fill casing material with bulk biochar and seal each end).
- Number of filters per tonne of biochar will be determined by chosen size of casing material and type of biochar used.

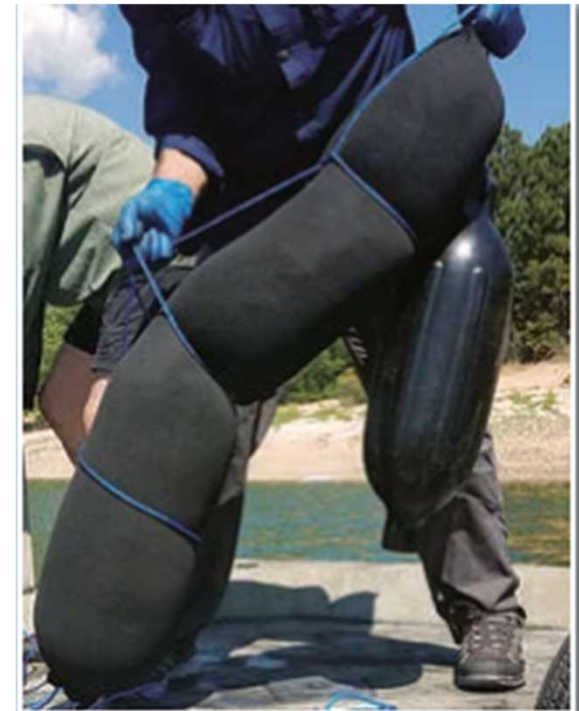
# Drainage ditch filters

- Careful site selection.
- Filters placed horizontally across drainage channel.
- Possibility to stack or repeat to maximise contact with water.
- Sites should be photographed, and GPS coordinates recorded.
- Ongoing inspection, testing and monitoring to assess impacts.
- Removal and replacement following 6-12 month period in position.



# In Water Body Filters

- Similar filter casing material to be used with addition of a surface buoy on one end and a weight/anchor on the other.
- Site selection: known nutrient hot spots, near inlets, away from well trafficked areas.
- Filter placed vertically in water column, anchored by weight, with buoy at surface level holding it upright.
- Sites should be photographed, and GPS coordinates recorded.
- Ongoing inspection, testing and monitoring to assess impacts.



# Considerations

- At the end of a test cycle, the filters should be removed from all locations and a representative sample from both in-water and in-ditch filters to be sent for analysis to identify levels of sorption of nitrogen and phosphorus.
- Ideally, Lake water samples should be taken and analysed monthly over the 12-month period for a range of physiochemical parameters including the levels of phosphorous and nitrogen.
- Other parameters could be noted based on best practice, likely including, but not limited to, chlorophyll levels, Biological Oxygen Demand (BOD), oxygen levels, turbidity, pH, temperature etc. The sampling and subsequent analysis should be carried out by environmental survey specialists and using accredited labs where applicable.
- While this approach has proven successful in other regions, this would be a pilot/ proof of concept that will attempt to see how the approach fares under Irish conditions using Irish biochar stakeholders and supplies.
- Potential exists to reuse spent filtration media as soil conditioner or improver.

# Unknowns

- Biochar is variable in nature. Levels of sorption may vary depending on feedstock and processing technologies and temperatures.
- Regular testing of the biochar would determine the level of sorption.
- Application rates are unknown – how many filter units to cover a certain sized water body will need more R & D to optimize.
- Replacement rate is unknown- possibly 6 month to a year, depending on location, nutrient levels, contact time , flow rates etc.
- Most suitable filter casing material TBD (coir, polyethylene , jute etc.)

# Opportunities

- Potential for regional biomass and carbon management systems to enable local biochar production, as part of a long term strategy.
- Filtration can be done alongside other management techniques (phytoremediation ,buffer strips, nutrient management plans etc.).
- Approach(if successful) could be replicated across other water bodies suffering from eutrophication.
- Great potential for the development of modified biochars capable of increased specificity for the removal of phosphorous(e.g. MgO doped biochars).
- Opportunity for cooperation with relevant stakeholders (ASSAP, LAWPRO, IFI, NPWS, EPA, Local Authorities, Farmers, Foresters and Landowners etc).
- Educational opportunities( Environmental & Agri. sciences, Institutes of Technology, Primary & Secondary schools etc.).

# Key Numbers

Company	Biochar Type	Apprx. Cost	Apprx. Volume/T	Apprx. Number of 8" by 48" Filter Bags/T	Apprx. Current Weekly Production Capacity
IrBEA Member A	Olive Stone Biochar	~€850/Tn	~2.2 m <sup>3</sup> /Tn	50	~ 28 Tn
IrBEA Member B	Softwood biochar	~€1000/Tn	~3-4.0 m <sup>3</sup> /Tn	100	~ 8 Tn
IrBEA Member B	Hardwood biochar	~€1300/Tn	~3-4 m <sup>3</sup> /Tn	100	~ 8 Tn
IrBEA Member C	Hardwood biochar	~€2-3,000/Tn	~ 3 m <sup>3</sup> /Tn	75	~ 1 Tn

- Production capacity is growing based on market development
- Further details available if required

# Irish Bioenergy Association Contact Details

Seán Finan IrBEA CEO

[seanfinan@irbea.org](mailto:seanfinan@irbea.org)

Tel: 00353 87 4146480

[www.irbea.org](http://www.irbea.org)

Stephen McCormack IrBEA Project  
Executive

[stephenmccormack@irbea.org](mailto:stephenmccormack@irbea.org)

Tel: 00353 874403242

THREE C Project Twitter: [@ireland\\_direct](https://twitter.com/ireland_direct)