

# CRUMRUBBER™ MÓNAFIL® & MÓNASHELL®

## Odour Control Units

Using recovered materials to provide patented high performing solutions for odour abatement and treating VOC air emissions for the Municipal, Utility and Industrial markets.



**ANUA** Clean Air  
INTERNATIONAL

We aim to provide high performing patented biological technologies for the treatment of air pollution, providing best in class performance with the lowest utility and life cycle cost. We are committed to providing low cost, robust, sustainable solutions bringing benefits to Industry and the local communities they serve. We will enable our people to realise their potential and that of our business through open communication, scientific excellence, and ethical business practices. Our technology goal is the use of recovered materials to provide high performing solutions.

## COMPANY BACKGROUND



Anua Clean Air International Ltd (Anua Clean Air) is a well established company with a long history associated with the provision and development of biological air filtration technology. The company acquired Bord na Móna MónaShell® and MónaFil® brands and the associated patent portfolio for these and new emerging technologies. The company was founded by Ian Phillips who spent much of his working career developing and deploying these technologies for Bord na Móna.

Anua Clean Air's manufacturing facilities are located in Cushina, Portarlinton, Co Offaly. The company owns and operates the manufacturing equipment for MónaFil® and MónaShell® media. Anua Clean Air's core focus will remain on utilising recovered materials to provide best in class biological air treatment technologies. The company is uniquely positioned to provide back-up and after sales service including technical support, replacement media, system upgrades and new skid mounted or site erected MónaShell®, MónaFil® and CrumRubber™ systems.



Anua Clean Air operates through historic International sales channels. Closer co-operation with Air Clean Srl (Sister company and long standing Italian distributor) allows for full turnkey contracting and the utilisation of a combination of biological (MónaFil®, MónaShell®, CrumRubber™) and conventional technologies (activated carbon, chemical scrubbers, bag filters etc) where required.

➤ [anuacleanair.com](http://anuacleanair.com)



Air Clean Srl is a company specialising in environmental rehabilitation of polluted air streams, primarily from industrial emissions, waste water and solid waste treatment processes. Air Clean operates on a worldwide basis, offering the full range of air treatment technologies including; biological, chemical and physical technologies.

Air Clean is a fully integrated company performing all of the production functions in-house including design, manufacture, assembly, installation and final testing.

Access to the latest technology coupled with continuous research and collaboration with Universities and Key Partners ensures Air Clean provide the optimum solution for each individual application by using stand alone or multi – stage technologies (systems integration).

The partnership with Anua Clean Air International ensures Air Clean can offer best in class, patented, MónaShell®, MónaFil® and CrumRubber™ bio-technologies for the treatment of municipal and industrial odour including VOC emissions.

➤ [aircleansrl.com](http://aircleansrl.com)



Air Clean USA are our Exclusive Distributor of our Patented Biological Air and Biogas Cleaning Technologies MónaFil®, MónaShell® and CrumRubber™ which provide the best-in-class solution with lowest life cycle cost achieved by using stand alone or multi-stage technologies.

Air Clean USA specialise in supplying these Biological systems for air purification along with Chemical washing towers for air purification and activated carbon systems for air purification. They also specialise in wet and dry dust removal system for many applications including Composting plants.

The partnership with Anua Clean Air the owners of Patented technologies and the brands MónaShell® and MónaFil® brands and the associated developed portfolio for existing and new emerging technologies, ensures Air Clean USA can offer best in class, proprietary, MónaShell®, MónaFil® and now the new CrumRubber™ biotechnologies for the treatment of municipal and industrial odour including VOC emissions.

The company is uniquely positioned to provide back-up and after sales service including technical support, replacement media, system upgrades and new skid mounted or site erected MónaShell®, MónaFil® and CrumRubber™ systems.



## PATENTED BIO-TECHNOLOGIES FOR AIR TREATMENT

### CRUMRUBBER™

In the early 2000's, Bord na Móna identified CrumRubber™ as an ideal media with the capability to catalytically remove and convert H<sub>2</sub>S to sulphate (origin of material waste automobile tyres). The media could be regenerated by continuous or intermittent flushing with water. Typical removal efficiencies for levels from 10 to 200 ppm of H<sub>2</sub>S ranged from 30 to 70 percent. The concept was patented but never fully commercialised. In 2009 a new research program was commenced to identify an inert recovered biotrickling media for treatment of H<sub>2</sub>S. The testing of CrumRubber™ was resumed, the initial work demonstrated the CrumRubber™ media had an excellent affinity for capture of H<sub>2</sub>S and conversion to sulphate, however it was not ideal for establishing biological activity. Critical parameters were optimised and a means of developing successful biological treatment was perfected. Treatment efficiencies in excess of 98% was achieved on high H<sub>2</sub>S levels. Following carried out on Landfill gas treatment levels in excess of 2000 ppm were successfully treated with this technology. Two separate patents have been applied for using this technology, one for treatment of air and one for treatment of landfill gas and biogas. Anua Clean Air has acquired the rights to these air cleaning patents.

### THE MÓNAFIL®

MónaFil® is a biofiltration process utilising specialised peat media as a capture and support medium to treat air emissions. Microorganisms are immobilised on the liquid layer on the surface of the filtration media, as air passes through the filter, odorous compounds are removed and oxidised biologically. An irrigation system is employed to maintain optimum conditions in the filter. The media is engineered to enhance its physical and chemical properties and to achieve optimum air treatment performance in terms of:

- Removal efficiency
- Reduced footprint
- Optimised effective contact
- Minimum pressure loss
- Enhanced media life

Every MónaFil® system is designed to best meet the client's specific requirements and to provide the optimum odour abatement solution.

### THE MÓNASHELL® PROCESS

The MónaShell® Biofiltration System from Anua Clean Air is a unique patented technology, which allows for the biological treatment of contaminated airstreams. Microorganisms immobilised on a filtration media oxidise captured pollutants. MónaShell® is a natural biological system that utilises selected microorganisms capable of degrading high levels of H<sub>2</sub>S and organic sulphur compounds. The media assists in controlling pH by neutralising the acid by-products. This allows for the treatment of high levels of H<sub>2</sub>S and reduced sulphur compounds. The process is further enhanced by the physical structure and chemical properties of the media. This allows for smaller filters with higher efficiencies and improved elimination capacities.

The process has also proved to be effective for the treatment of Volatile Organic Compounds (VOCs) and nitrogen-based compounds.

#### MónaShell® at Work

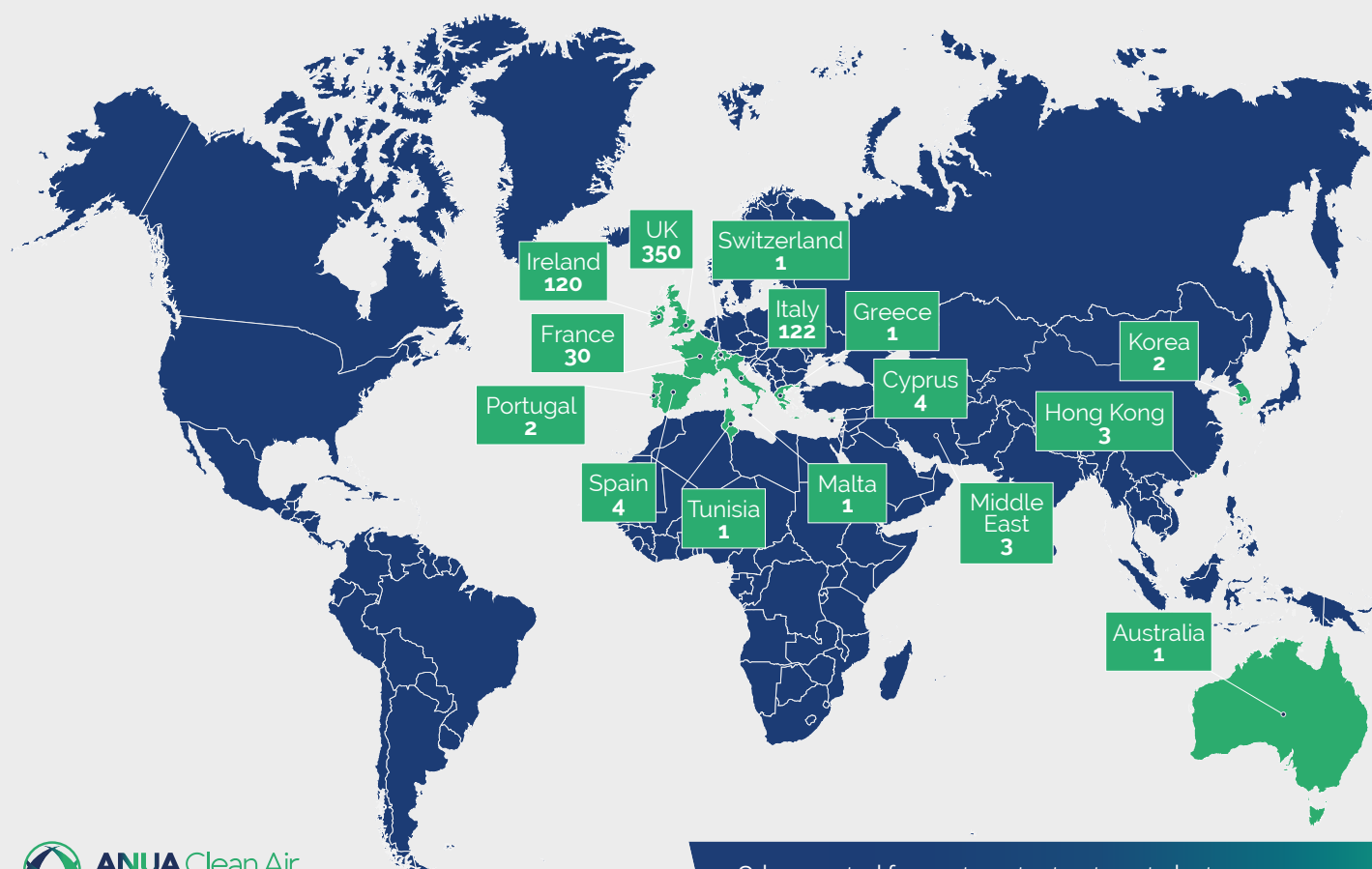
As air passes through the MónaShell® filter the chemical contaminants are captured by a combination of physical processes into the liquid layer on the surface of the media where an active biofilm breaks down the odorous compounds. Acidic by-products are neutralised by the shell media ensuring optimum pH conditions. The MónaShell® is continuously irrigated ensuring minimum top up requirements.

Anua Clean Air have two further patented enhanced MónaShell® offerings.

- MónaShell® Multi Media Multi Pass. Utilises different shell media in different stages to optimise performance, media life and utilisation of different shell media on H<sub>2</sub>S applications.
- MónaShell® EBF for the biological treatment of difficult industrial emissions containing high levels of VOC, H<sub>2</sub>S and organic sulphur groups VOCs. The technology utilises enhanced airflow dynamics and electro magnetic stimulation of the water to enhance capture and treatment of low solubility VOCs.

# WORLDWIDE DISTRIBUTION OF ANUA CLEAN AIR SOLUTIONS

We offer proven, patented clean air bio-technologies, which provide best-in-class process performance with the lowest utility and life cycle costs.



## ANUA CLEAN AIR INTERNATIONAL LTD

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### Registered office

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### Local office:

France: [frsales@anuacleanair.com](mailto:frsales@anuacleanair.com)

- Odour control for waste water treatment plants:  
650 plants, more than 3000000 m<sup>3</sup>/hr of treated air
- Odour control for solid waste treatment plants:  
20 plants, more than 2500000 m<sup>3</sup>/hr of treated air
- Odour control for VOC treatment and food industry:  
150 plants, more than 1000000 m<sup>3</sup>/hr of treated air



### Sister Company

Air Clean S.r.l. | Via Ugo Bassi 14  
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