

ON-GROUND REDUCTION OF GASEOUS EMISSIONS USING MINERAL-BASED MEDIA



**METHANE ABATEMENT IN LIVESTOCK FARMING.
REDUCTION OF GASEOUS EMISSIONS AND ODOUR FROM OPERATING LANDFILLS.
MEASURABLE AND VERIFIABLE IMPACTS.
VALUE ADDING THROUGH CARBON CREDIT GENERATION AND SOIL CARBON IMPROVEMENT.**

Statement of Qualifications

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Pact Renewables Pty Ltd

www.pactrenewables.com

Pact Renewables has developed an innovative mineral-based composite technology (MBC media) and have conducted large numbers of laboratory and plot-based investigations on applications of the MBC composite formulations for land-based GHG removal to livestock farming, as well as abating methane from operating landfills. The company is offering its technology on an advisory basis to help industry and their carbon project developers and advisors, and governments to assess, identify options and implement land-based emissions removal solutions to minimise GHG emissions impacts whilst generating value to offset operation costs.

Sources of Greenhouse Gas (GHG) Emission?

Anthropogenic GHG emission sources that can be abated by applying the MBC media include livestock farming and municipal and C&D landfill operations. The GHG make up, concentration, level of emissions depend on the gas generating sources and mechanisms of emission from a substrate, and intimately linked with the nature and mode of individual livestock farm and landfill management practices. For example, with cattle, despite significant technological progress with enteric methane reduction, manure still represents around 10% of all methane emissions.

GHG emitting industries, where the MBC media can be directly applied on-ground for effective reduction methane emissions include:

- > Cattle (beef and dairy) farming emitting methane from manure piles
- > Poultry and pig house farming emitting nitrous oxide (N₂O), as well as ammonia and odour emissions from wet bedding impacting on the hygiene and health of the animals and farm workers
- > Current landfill operations (municipal solid waste and construction & demolition) primarily emitting methane and CO₂.

Environmental and Operational Challenges

Although the extent and the actual rate of GHG emissions from the mentioned industries is highly dependent on the management strategies implemented at individual operation level, nearly all face the common challenges of:

- > significant contribution to global warming
- > high carbon footprint of operations potentially exposing the operations with export revenue to tax liabilities such as carbon border adjustment mechanism (CBAM)
- > potential for damages to both corporate reputation and ESG commitments to shareholders
- > increased regulatory requirements to reduce risks associated with GHG emissions to community, animal/workers welfare and the environment.

An opportunity provided by the MBC technology relates to addressing the above challenges, whilst turning the abated GHGs into a revenue generating source by accruing carbon

MBC media technology and how it works

MBC is an enabling technology for the production of mineral-based media containing organic fibres (i.e., crop residues) as a specialty feedstock for manufacturing products with various industrial and environmental applications, including media for abatement of GHGs from livestock farming and landfill operations, whilst also reducing ammonia and odour from poultry farms and piggeries. More information can be found at: <https://www.pactrenewables.com/cardboard-to-productsctp>

The MBC media can be prepared by the livestock farmer at relatively low cost, using common farm machinery and both its preparation and application will require minimal modification to the way farmers currently manage their livestock manure. Further, the composite's make up minerals are gypsum (major component), as well as magnesia and sulphate of potash (minor components), all widely used by farmers. A pre-determined amount of crop residue and water are added to this mineral mixture and mixed together to produce a fibre-containing mineral aggregate, which is set within a few minutes. All types of crop residues, whether from no-till, strip-till or reduced till agricultural practice are suitable fibre sources.

The aggregate is then spread on the ground in open air to dry for a few days before placing it on top and the sides of manure or landfill piles. Our preliminary trials have confirmed the efficiency of the media in absorbing and permanently sequestering a substantial portion of methane, nitrous oxide and carbon dioxide emitted from such piles. The capture and sequestration process involves concurrent absorption of GHGs by the moist fibre, in contact with the manure or landfill substrate, whilst the aggregate undergoes changes in its mineralogy by co-formation of diagenetic carbonated minerals.

As the GHG capture and sequestration is completed within a few days, the carbonated media is then blended with the underlying manure and the applied to farmland or grazing land as a degradable nutritious soil additive, using common farm machinery, with no impact to animal health. With landfills, the pile containing carbonated media is spread and the media application process repeated on a daily basis.

Our innovative MBC media and methods of on-site preparation and application can potentially address the hesitancy of farmers in adopting new technologies, which require changes in farm management practices, high upfront costs and the need to learn new technical know-how.



Contacts

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Key Attributes of MBC Media Technology

Our technology will enable farmers and landfill operators to leverage our MBC media to reduce the carbon footprint of their operations whilst generating verifiable carbon credits.

Key media attributes:

- > simplicity of formulations and application allows flexibility to provide fit-for-purpose solutions according to client objectives
- > media preparation and application are similar to the lime and gypsum dosing commonly practised by farmers to condition their soils
- > uniqueness of emissions reduction methods in terms of onsite production and application leads to generation of carbon credits with substantially low life cycle cost
- > simple technology with minimal upfront costs and technology know-how needed for production and media application using existing farm equipment
- > land application of the media has no adverse impacts on animal welfare
- > fixed, quantifiable sequestered methane enables verified reduction and carbon credits for livestock farmers.

Our MBC technology has the potential to become a catalyst to increased total soil carbon budget and enable farmers, large and small, to embrace carbon credit generation as a supplementary revenue source.

More information: info@pactrenewables.com

Our advisory services approach is based on providing expertise on application of MBC media for abatement of greenhouse emissions, and where possible, carbon credit generation by livestock farmers and landfill operators; commencing with various levels of feasibility assessments, follow up project development, project establishment and post-project support.

How we Offer our services

Feasibility assessments commence with a scoping study (which may include site visits and limited laboratory test work, if necessary) to provide a high-level evaluation of the emissions reduction and credit generation options for a livestock farm or a landfill, as a first step. Subject to feasibility presentation and satisfactory outcomes, this will extend to a full feasibility assessment which commonly involves core sample study, soil carbon analysis, assessment of land features, crop residue types available for optimising MBC formulations and site visits to define the best-fit option for project development. This is then followed by detailed integrated techno-economic and life cycle cost assessments for commercial decision making.

If the client seeks a carbon credit opportunity, Pact Renewables will work closely with the company and/or nominated carbon project developer who will define and cost various scenarios for carbon credit generation, potential carbon yields, operating conditions, profits, cash flow, and associated risks. We will also provide strategic advice on technical aspects during the carbon project registration phase.

Deliverables from our feasibility assessments commonly typically include:

- > characterisation of land and livestock operations for greenhouse and noxious gas abatement assessment
- > definition of impacts and management options
- > treatment technology economics and lifecycle assessments
- > development of treatment technologies for site specific applications
- > subject to satisfactory outcomes from the above, support with carbon project registration efforts.

We have proven experience in carrying out successful feasibility studies, project design and planning services that will ensure your emissions abatement and carbon credit project is implemented successfully and relevant methodologies are optimised for your land against eligibility and suitability criteria to ensure enhanced returns, at minimised risk.

Post-feasibility assessment, we will also provide support with project establishment, including public demonstration of the technology, third party sourcing (introduction of material suppliers, technical expertise such as soil scientists and agronomists), cost estimations, and EPC (engineering, procurement, construction) providers. Our support will extend to post-project implementation in the form of back-up and technical problem-solving services and optimisation of monitoring, reporting, verification (MRV) schedules.

Why Choose Pact Renewables

- > Deep knowledge of scientific, technical, and environmental aspects related to land-based greenhouse and livestock emissions removal
- > Focused technological solutions, using proprietary proven technology platforms developed by Dr Aharon Arakel (recently selected as a Top Innovator by the World Economic Forum) and his team
- > The Company follows a fundamental approach based on footprint reduction via waste minimisation, through recovery of values which may include generation of carbon credits
- > Worldwide experience, past performance, and technology reputation
- > Unique expertise in carbon and saline waste removal and established project delivery capabilities backed up by specialised in-house analytical and process/product evaluations to large piloting stage.