# SUSTAINABLE OR GREEN REMEDIATION?

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Companies involved in construction across Europe increasingly have to consider their corporate reputations when undertaking projects. As remediation is a fundamental element of developing on contaminated and brownfield sites, companies need to acknowledge that their corporate responsibility must start from the ground-up. Sustainable remediation is a powerful solution to protect corporate image, but as Richard Clayton, Director at WSP Environment & Energy, suggests this is not as simple as it sounds.

Remediation is the 'clean up' of brownfield and contaminated sites – driven by government policy, protection of the environment and demand for regeneration of urban space. However, sustainability and remediation do not always go hand-in-hand. Driven by rigorous environmental protection policies, traditional remediation programmes consume energy, generate waste and produce atmospheric emissions. In addition, they rarely result in the complete removal of contaminants – instead transferring them from one place to another.

Legislation will always require the remediation of soil and groundwater contamination. However, with clients and governments looking to be more sustainable, tools and technologies are being developed to promote and demonstrate that a more reasonable balance can be achieved between environmental protection and mitigating the adverse impacts associated with traditional long-term remediation programmes.

This is the utopia of sustainable remediation; but sustainability means all things to all men and the interpretation of what sustainable remediation should look like will vary widely across the European Community where perceptions of risk, value sets and cultures can be markedly different.

## SUSTAINABLE REMEDIATION DEBATE

The issue of sustainable remediation is now hotly debated amongst the contaminated land and remediation sectors, with a wide range of US and European initiatives established to explore and define sustainable remediation, such as SuRF (Sustainable Remediation Forum) and SuRF UK (hosted by CLAIRE), Eurodemo, REC and ROSA. These initiatives have varying mission statements, terms of reference and very different approaches to the definition, characterisation and quantification of sustainable remediation. Simply understanding the term "sustainability" is being keenly discussed amongst remediation professionals for example at the ConSoil (Milan, June 2008) and the Battelle (Monterey, May 2008) contaminated land and remediation conferences.

The current debate on sustainable remediation represents a microcosm of the global sustainability debate that has been ongoing for the last 10 to 20 years. The risk for the remediation sector is that in awaiting a definition, this debate is used to legitimise doing nothing; that we wait for legislation and guidelines and that opportunities are lost. Although we seek to deliver responsible remediation, we are in danger of becoming distracted and obsessed with the discussion. For example, quantifying the "value" of a river or an ecosystem to a future generation is a complex and difficult argument. Advancing such a process will require multiple attempts at Life Cycle Cost Assessment and Cost Benefit modelling. These models and processes are not established and, although achieving this is the ideal and longer term objective, we should instead focus on the quantifiable - money. The perception that sustainable means more cost needs to be challenged. To do so, we need to focus in the short term on not only challenging the need to remediate, but, once this decision has been made, also on how to optimise and select the best technology.

## GREEN REMEDIATION

Through these recent debates we see a more tangible and achievable target emerging: "green remediation". "Green remediation" focuses on the remediation technologies employed, the objectives of the remediation scheme, and impact of the remediation works against the environmental improvement achieved by the works. What defines "Green Remediation" versus "sustainability" is a reduced emphasis on seeking to quantify wider intangible social benefits, though some will logically accrue, for example, by better carbon management. The aim is to take responsibility for our actions today using the tools available, while efforts continue towards the delivery and the measurement of true "sustainability".

The green remediation techniques available will vary greatly from site to site, and the large majority of sites will require more than one method of remediation. The key is to ensure that, where possible, sustainable or green options are available and utilised in place of traditional, more intensive processes. In selling green remediation to our clients we need measurable complimentary accounting systems considering and then assigning a monetary value to energy, waste, materials, water, and carbon intensity.

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## CARBON CALCULATING

To enable clients to understand the effects of remediation processes, and evaluate cost and time implications versus wider environmental impacts, WSP has developed a carbon calculator. The tool, which is just one step in the sustainable or green remediation process, provides a carbon footprint for the overall remediation of a site, allowing clients to choose the right combination of clean-up methods.

The remediation footprint takes into account the impact of energy consuming processes, such as soil excavation and processing, soil treatment, plant and accommodation, personnel attendance and associated travel, together with the environmental impact of associated transport and waste. This overall carbon footprint can then be compared with the overall pollution mass reduction achieved by the remediation works to establish the true environmental benefit of the remediation works, which is the key step.

## BEYOND CARBON FOOT-PRINTING

Whatever aspect of environmental accounting we consider, it must always be brought back to the environmental benefit achieved by the remediation programme versus the true cost of delivery against the risk and need for environmental protection.

Remediation techniques are available that are relatively low cost and relatively sustainable. Equally, the only remediation techniques available for some contaminants are energy intensive and, in these situations, the only option may be to consider carbon off-setting or similar to acknowledge the impacts of the remediation programme.

An increasingly favoured and typically less aggressive method of remediation is bioremediation. The objective here is to enhance existing bacteria on a site so that it breaks down contaminants in soil and groundwater. The process works with nature to provide a low-energy, in-situ method of clean up. It can be time-intensive, but is likely to be an approach favoured by regulators.

Often coupled with bioremediation in a "treatment train" are chemical oxidation and reduction techniques. These are rapid, low energy technologies that chemically degrade contaminants in the sub-surface.

Whichever method or combination of methods is selected, detailed site testing should be employed to ensure that remediation works are confined to highly targeted areas to minimise any unnecessary activity and supported by high standards of quality assurance.

## NOT COSTING THE EARTH

The sustainable or green remediation technologies discussed in this article by their nature have low plant and energy demands and, therefore, represent cost effective solutions in comparison to traditional techniques, such as land filling for contaminated soils or pump and treat for groundwater, or more energy intensive thermal processes now frequently favoured.

However, application of these technologies across Europe is governed by differences in legislation and remediation. Some countries, such as Italy, do not permit the "injection" of chemicals into the subsurface and have strict remediation standards preventing their use.

## CONCLUSION

Achieving sustainable remediation requires a pragmatic regulatory framework and strong government commitments to sustainability. A balance is required: do we continue our pursuit of environmental protection and continue to contribute to climate change and greenhouse gas emissions, or do we reconsider policy to allow green remediation techniques to be applied?

Currently, delivering sustainable remediation remains problematic yet cost effective. Easy wins can be made by promoting the consideration of green remediation best practice.

Looking forward, leading practices will combine traditional methods and regulatory understanding with technological innovation to drive new approaches that will significantly improve the green credentials of a remediation project.

## FURTHER INFORMATION

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