



# Interstate Technology & Regulatory Council

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## Green and Sustainable Remediation: State of the Science and Practice (GSR-1)

### EXECUTIVE SUMMARY

Numerous initiatives are taking place in the field of green and sustainable remediation (GSR). In this technology overview document, the Interstate Technology & Regulatory Council (ITRC) GSR Team introduces the concept of GSR and charts its current status. By providing some basic definitions and describing the approaches of different agencies, states, and other entities, the GSR Team aims to help educate and inform state regulators and other stakeholders in the concepts and challenges of GSR. One of the greatest challenges of GSR is the current lack of consensus on applying measures of sustainability. In this document, the GSR Team summarizes current definitions and tools available to help users incorporate sustainability factors into site management decision making. There is no industry-wide consensus on the definitions of the term “green and sustainable”; therefore, discussions on this area may not be addressing consistent concepts. This document is meant to be not guidance, but rather a discussion of ideas as they currently appear to exist. It is expected that these concepts, definitions, and tools will continue to rapidly evolve. This overview is a companion document to the GSR Team’s forthcoming technical and regulatory guidance document.

The development and evolution of hazardous waste statutory and regulatory authorities and years of experience in site remediation have produced an established process for remedy selection and implementation based on protection of human health and the environment. Some past practices have resulted in remedies for which green or sustainable aspects were not often considered; rather, if a remedial action considered green or sustainable elements, it was often as an afterthought. The federal government, states, industry, and academia have all been hard at work developing more comprehensive approaches to consideration of green remedial measures as part of environmental restoration, thus making the development of this document timely. Green remediation is not a stand-alone concept but is rather part of the overall remedial process to protect human health and the environment. A global focus on assessing the causes of climate change and a collective growing awareness of the potential adverse impacts of energy-intensive remediation systems have resulted in an increasing array of directives and orders to minimize the impact of the remedial environmental footprint, prompting the investigation and implementation of GSR approaches.

Many federal and state-lead cleanup programs have begun to consider how remedial actions could lower their environmental footprint. This is considered “greening” the cleanup or a green remediation, whereas a sustainable cleanup would go further to consider economic and social aspects. Most practitioners understand that sustainability involves three basic aspects, including environmental, economic, and social considerations. Sustainability may be considered on a scale from local to global effects of the remedy, depending on the boundaries identified during the GSR planning process. This idea is discussed further in the planning section of the forthcoming

technical and regulatory guidance document.

Remedy decisions need to be made in the context of the regulatory scheme within which the remedy is being conducted. For example, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA) programs have a regulatory process, and consideration of green remediation may be part of remedy selections. Remedy decisions consider remedy cost and reasonably anticipated land use as part of the alternatives development and remedy selection. More expansive concepts of social and economics are generally not part of the remedy selection process under CERCLA but may influence state and community acceptance, which is considered in remedial alternative analyses. Remedies may often be implemented in ways that take into consideration social and economic perspective.

The ITRC GSR Team envisions that greener remedies are a natural extension of these established programs that can be considered as part of the remedial action process. There is a clear need to implement remedies in a way that minimize the environmental footprint, and while efforts to advance that goal are moving rapidly on many fronts, understanding what is meant by the term “sustainable” is an ongoing effort. That effort includes identifying opportunities for ensuring that remedies support the needs of the community.

While program-specific regulatory criteria do not address the broader societal and macroeconomic considerations, programs operating under the National Oil and Hazardous Substances Pollution Contingency Plan may allow for implementation of many sustainability measures. Potential limitations to the inclusion of green remediation within the CERCLA and RCRA regulatory framework are being identified and discussed, especially with regard to the nine criteria currently applied to the standard remedy selection process. The U.S. Environmental Protection Agency (EPA) is presently clarifying the role of green remediation within the context of these criteria and believes that most green remediation measures fit nicely within the existing criteria. EPA emphasizes that, while the evaluation of economic and social aspects of sustainability of remediation is valuable and can help inform the overall course of cleanup, specific inclusion of these aspects may exceed the authority of current regulatory programs.

This document presents GSR concepts that can provide consistency in application and consideration of GSR during the site-management process. By approaching GSR as an improved site-management process, impacts to human health and the environment can be effectively addressed, while considering how to maximize social and economic benefits, thereby making GSR a logical extension of the evolving remedial action process.

The GSR Team urges caution regarding the usage of GSR language and terminology, which is under development across organizations and generalized in nature. A variety of terms are being used, and care must be taken in using these terms specific to any program areas, such as CERCLA.