



SUSTAINABILITY

New tool to help industry manage bauxite residue

A NEW SUSTAINABILITY assessment tool may help the alumina industry better manage bauxite residue.

One of the key environmental impacts of alumina production is the generation of bauxite residue, also known as red mud, which is what remains after bauxite has been treated using the Bayer process.

Current industry practice is to store bauxite residue in engineered facilities that become part of the landscape. In its 2001 technology roadmap, the alumina industry recognised the need to develop methods to achieve a 1000-year ecologically sustainable storage of red mud and other solid wastes.

The Quantitative Sustainability Assessment Tool for Bauxite Residue Management (SAT) – developed through the Parker Centre with funding from the industry via AMIRA International – could assist the industry in its endeavours to achieve this outcome.

The SAT was developed using scientific expertise from CSIRO and the Centre for Sustainable Resource Processing (CSRP), as well as firsthand experience from the alumina industry.

Dr Greg Power, senior research consultant with the Parker Centre, explains key principles used to guide the development of the tool: “The SAT needed to provide a strategic outlook to help users track progress towards achieving their long-term sustainability vision for residue management.

“It also needed to consider the environmental, social, technical and economic outcomes of bauxite residue management in an integrated manner.”

The tool uses a combination of different types of indicators – management, condition and operational – to provide an integrated assessment of past, current and future sustainability performance.

These indicators are then combined with a five-level, semi-quantitative evaluation scheme to

achieve a practical balance between high-level sustainability aims and consideration of operational and other factors that determine sustainability performance. In the evaluation scheme, level five is the theoretical ideal and defines what is highly desirable from a sustainability perspective.

“An organisation using the SAT starts with the ideal state and then, using a method known as back-casting, determines the ‘best reasonable value’ for their organisation. This ‘best reasonable value’ reflects the best imaginable performance – preferably approaching the ideal state – which is achievable with current and conceivable future technology and engineering.”

Once the ‘best reasonable value’ is established, the organisation can document its current practice, and use gap analysis to identify improvement opportunities for its planned future.

Other steps in the assessment process include: actual performance, which should improve over time to approach the levels of the planned future, and strategic

alignment, in which the planned future is continually reviewed in light of progress achieved.

The SAT is implemented in three stages:

- setting up the tool for application at site level – defining best reasonable values and weighting factors;
- assessing the site on all key performance indicators (KPIs) – determining performance under current practice and planned future for each KPI and recording the supporting evidence in a transparent and accountable manner; and
- analysing sustainability performance – interpreting and presenting the results of the sustainability assessment, and providing direction for improvement plans.

The SAT was successfully trialled at an operating residue storage facility in early 2007. This pilot study confirmed the practicality and usefulness of the methodology and showed that it complemented existing audit protocols and strategic planning processes.

According to Dr Power, the SAT is a valuable addition to existing environmental and social audit and assessment tools for assessing long-term impacts and benefits from residue operations.

“The tool also demonstrates that even with imperfect knowledge and uncertainty, quantified sustainability tools can be developed that aid in decision making on technology development and implementation.”

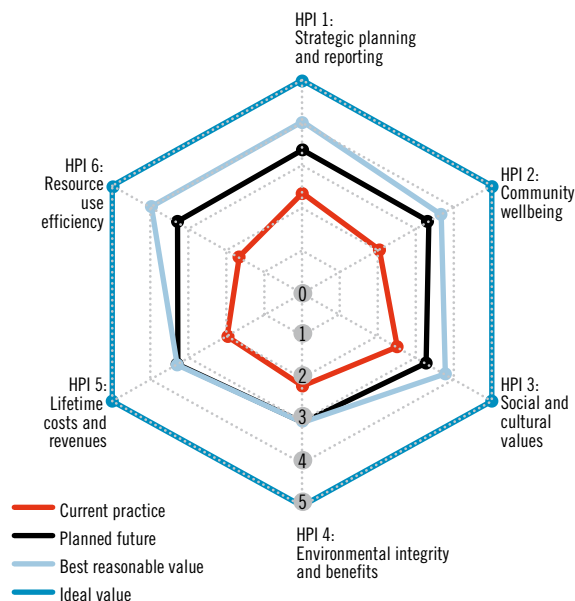
The tool was developed in close collaboration with the industry, led by Dr David Cooling of Alcoa, and with academic leadership from Dr Rene van Berkel, an internationally recognised expert in sustainability and cleaner production.

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An illustration of an overall result using the SAT*

Performance indicators



*values displayed are example values only