The need to reduce dependency on fossil fuels, a growing world population and an increased concern for the environment are driving companies to supplement oil-based chemicals with plant-based, sustainable, high-quality chemical building blocks. Reverdia™, a company backed up by DSM + Roquette, produces the sustainable succinic acid Biosuccinium™ with proprietary green technology. It enables customers to produce bio-based, high-quality performance materials while at the same time substantially improving their environmental footprint[1].

Compared to bacteria-based processes, Reverdia’s low-pH yeast process is also much less vulnerable to infection. As a result, production equipment requires less cleaning and handling, which improves both the consistency and quality of the bio-based succinic acid product.

**Simple and environmentally-friendly production**

Biosuccinium is not only renewable, but also provides an ecologically sensitive way to produce succinic acid. This feature is becoming increasingly important to environmentally-conscious downstream customers. They now want more environmentally-friendly products for ethical reasons, but also in order to help project an eco-friendly brand image as consumers increasingly demand green products. Biosuccinium, for example, can be used as an alternative for petrochemically produced adipic acid in many applications such as production of polyesterolys for polyurethanes, coating and composite resins and phthalate-free plasticisers.

Life-cycle assessment (LCA), a technique that identifies the energy, material, and waste flows of product production and their impact on the environment, is becoming the standard for comprehensive ecological assessments. LCA was
The low-pH process technology is based on proven technology for other compounds such as citric acid, itaconic acid and lactic acid.

**Unique proprietary technology**

Biosuccinium is protected by a robust patent portfolio surrounding its low-pH fermentation process. It is currently being successfully produced in a 300 metric tonne capacity demonstration plant in Lestrem (France). This facility is used for process validation and optimisation, as well as to provide tonne-scale quantities of Biosuccinium to customers for internal testing and application development.

In the second half of 2012, Reverdia will be opening a commercial-scale bio-based succinic acid facility at Roquette’s large biorefinery site in Italy’s Cassano Spinola municipality. This novel plant, which will have an annual capacity of around 10kt, is backward-integrated with the biorefinery-producing C-source. The site will employ the co-generation of steam and electricity and on-site waste water treatment. Its proximity to Genoa’s harbour also ensures efficient global logistics (Fig. 3).

**Driving market growth**

The development of Biosuccinium succinic acid will provide impetus to an entire range of more renewable, sustainable bio-based products. While current markets for succinic acid include pharmaceuticals, food, coatings and pigments, Reverdia believes that the production of a high-quality, bio-based succinic acid like Biosuccinium will help drive the emergence of new applications. Possible markets include those for the production of bio-based polyurethanes, polybutylene succinate (PBS), plasticisers, composite and coating resins, and 1,4 butanediol, which is used in products as diverse as packaging, footwear, elastane clothing, shopping bags, mulch films, and automotive interiors. When it comes to markets for products such as PBS, Biosuccinium is positioned not only as a direct, cost-competitive substitute for petrochemical-based succinic acid, but also as a competitive alternative for petrochemical adipic acid.

Market growth will receive a big leg up from the marketing and application experience of Reverdia’s parent companies, DSM + Roquette. DSM produces petrochemical succinic acid, and is a major user of petrochemical adipic acid. Roquette is the world leader in polylols, and produces isosorbide from sorbitol – a unique bio-based building block that is employed in a variety of material applications.

In its production of Biosuccinium with pioneering yeast-based technology, Reverdia is creating sustainable business opportunities for customers who want to produce high-quality performance materials that are also bio-based and better for the environment.

**Fig. 2: LCA Comparison of Biosuccinium™ vs. petrochemical adipic acid. The LCA was calculated cradle-to-gate for both substances. The Biosuccinium™ cradle-to-gate study was performed by CE Consult and validated by Patel and Roes of the Copernicus Institute in the Netherlands. The adipic acid data is derived from the public domain and internal validation for a best-in-class plant with excellent control over NOx emissions.**

**Fig. 3: Set to open in the second half 2012, the Reverdia™ plant for the production of Biosuccinium™ is still under construction at the Roquette biorefinery site in Cassano Spinola (Italy).**