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Advanced materials produced by nature Humankind is fascinated by chemical processes which create a new physical world. By experimenting, developing new technologies and transforming raw materials, people are creating new 'intelligent' materials based on natural raw materials which are adapted to human needs. Currently these new materials can be applied in products with short life-cycles, such as disposables and packaging – durable goods, too, like furniture, cars, etc. In many cases these so-called agro-based materials are biodegradable and many of them can be composted after their useful life-cycles. Agro-based materials can also be recycled or incinerated. These renewable resources include a large variety of cellulose materials such as flax, hemp, jute, ramie (stem fibre from the Philippines) and abaca (leaf fibre from South East Asia) as well as very advanced biodegradable polymers based on starch, glucose and protein. A combination of two or more materials is called a composite. The matrix material may be a resin, but also a thermoplastic material. Composites based on biodegradable materials as well as a combination of cellulose fibres with a synthetic matrix can be produced. By changing the combination of raw materials, composites with specific characteristics can be developed in various combinations of materials, colours, structures and patterns.

Beauty, a source for sustainability Renewable resources are often classified as environmentally friendly or biodegradable, without taking into account the specific aesthetics of these materials. Consequently, only a small group of people in the world are interested in the potential of renewable resources. The environmental issue alone is not a sufficient argument to persuade the public to favour renewable resources. People are interested first and foremost in a product's functional and aesthetic quality. This means that a product has to meet the user's needs instead of forcing him to behave in a certain way or to express a strong environmental statement.

Sustainability through temporariness Sustainability through temporariness is a way of thinking, an attitude, not a specific course of action. The final choice of a material based on renewable resources will depend on its application on the place, on cultural preferences and on the specific requirements of a product. Last but not least, preference for certain designs depends strongly on trends or fashions. A product's emotional and economic value declines in due course. Moreover, the material used in it

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loses its value during that period. The life-cycle of renewable resources also exhibits their characteristic growth and deterioration. There is interaction between the technical and economic uses of materials and current trends; in other words, the temporariness of the life-cycle of the applied materials reflects the ephemerality of fashion. Biocomposite materials are a first step in the search for new product designs in present and future trends. It will of course take time to develop products possessing such a combination of characteristics. However, the expectation is that ultimately we will have a new generation of products with hitherto unknown properties and functional advantages.

Jorn Behage (Brazil) is widely experienced in sustainable product development. Since 1993 he has been internationally involved in the development of materials based on renewable resources and their application in various products. In 1995 he founded Proterra, which stimulates the use of renewable sources by implementing the following activities.

1. Market development: gleaning, structuring and providing information. This also involves the search for new possibilities and the establishment of a network in a field of renewable resource based products.
2. Market exploitation: Proterra develops market niches for various companies with a view to creating a breakthrough for renewable sources.