

Editorial

“the recent initiative of EU Commission to identify “lead markets for biobased products” has shown that there is a need for realistic surveys in the EU-markets for RRM and RRM based products. In the last edition of Green Tech letters 3/2007 the French Agency ADEME published the results of the ALCIMED survey on existing markets and future perspectives in France. In the Green Tech letter 4/2007 ERRMA publishes the results of the market survey in Germany, summarised by FNR in Germany. In order to compare these both surveys on market perspectives the methodologies follow the same principles. It is our aim to motivate EU-Commission to broaden such a study EU-wide. These surveys give first indication also for the governments how to adapt the political frame work to develop these markets.

Dietrich Wittmeyer, general Secretary of ERRMA”

International opportunities for Bio-based products.

The symposium “Bio-based Business: Crossing borders” which was held on November 13 in Ede, The Netherlands attracted more than 60 delegates from mainly SME companies. These companies were interested in identifying opportunities abroad for new products based on renewable raw materials and what support is available to increase their chances on market success.

The meeting made clear that an international orientation could be very lucrative for Dutch companies. Export of in particular SME companies is rapidly growing and has an even larger potential, according to a recent report of the EIM Business & Policy Research

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► International opportunities for Bio-based products

Market Analysis resources

Institute. Also the market expectations for bio-based products in neighbouring countries like Germany France and the UK are very promising (see e.g. reports in this and the previous issue of the GreenTech newsletter). Speakers were convinced that in bio-based business an international focus is warranted for both raw materials procurement and end-product marketing.

Also Wijnand Schonewille of the Port of Rotterdam illustrated the international character of biomass transport logistics. With the Port of Rotterdam as Europe's largest harbour The Netherlands could play a pivotal role in biomass and bioproducts streams as well as in adding value to biomass raw materials by local processing.

During the symposium 4 entrepreneurs presented their experiences and best practices in becoming active in international markets. Many "do's and don't's" were presented by companies in the fields of injection molding biopolymers (Poly-one and Hy-cail), bio-based industrial cleaning agents (Eco-point), specialty chemicals and biofuels from algae (Ingrepro) and agrofiber reinforced construction materials (GreenGran). Each of the presenting entrepreneurs had identified many

opportunities and market outlets abroad but also had the experience that it takes a lot of energy enter such markets. In particular it appeared necessary to thoroughly study market peculiarities as well as to gain a good understanding of different international corporate cultures of the target countries. Help from experienced colleagues or experts can accelerate this process tremendously.

Help in international orientation can be manifold and can be obtained from several governmental, NGA, and commercial sources. It could include opening up new markets and (company) networks, like in India, where Maarten van Dongen of Bioport Europe is active and available for assistance. Also financing of increased activities due to international ventures is often a critical factor. One source of funding such activities was presented by Coenraad de Vries of StartGreen: a venture capital fund that is ear-marked specifically for bio-based ventures and has a low entry barrier due to governmental support through the Technopartner programme. On behalf of the EVD (Dutch Agency for International Business and Cooperation) Marieke Vossen presented several instruments, such as providing market information from many different countries and also by providing



SME's easy participation in economic trade missions. Such trade missions, headed sometimes by royalty or ministers, can be of valuable help in opening doors that otherwise might have stayed shut. Also the EVD can help SME's financially with their international commercialisation plans.

During the breaks and also after the meeting many companies have made new (commercial) contacts. From the response of meeting delegates it was clear that these new contacts may very well lead to new bio-based initiatives.

Prof.dr. Hans Derksen
President Platform Bio-based Business



also had the experience that takes trade missions, headed source of fund carried

international orientation can be manifold and

Which markets, resources and products are promising?

The German Federal Ministry of Food, Agriculture and Consumer protection (BMELV, german abbreviation) had commissioned a study to analyse and assess all markets for renewable resources. The overall objective of the study was to identify the most promising markets, and to develop strategic recommendations for the Government and the respective agencies, in particular the Agency for Renewable Resources (FNR). The identification of the most promising markets allows a concentrated use of public funds for market support activities and market introduction measures.

The study started in spring 2004 and was carried out by three institutes with comprehensive expertise in the different markets (Faserinstitut Bremen, Institut für Energetik und Umwelt, meó Consulting Team). The overall project management was carried out by meó consulting team.

In the first phase of the project, all markets for renewable resources have been assessed, based on an examination of relevant literature and discussions with industry

representatives. Several interviews and workshops with representatives of various associations, industrial and trade companies, and agricultural organisations have been organised. This approach ensured a practical approach and avoided an "ivory tower study". Customer requirements served as starting point for all market assessments.

The following markets were examined:

- electric energy
- thermal energy
- fuels

- lubricants
- chemistry
- colors & paints
- cosmetics & pharmaceuticals
- paper, paperboard & cardboard
- packaging products
- moulding & natural fiber reinforced composites
- textiles
- building materials & furnitures

Within these markets again, several renewable resources and products were analysed. All markets were analyzed in a similar systematic approach with similar indicators to facilitate an easy comparison of the different markets.

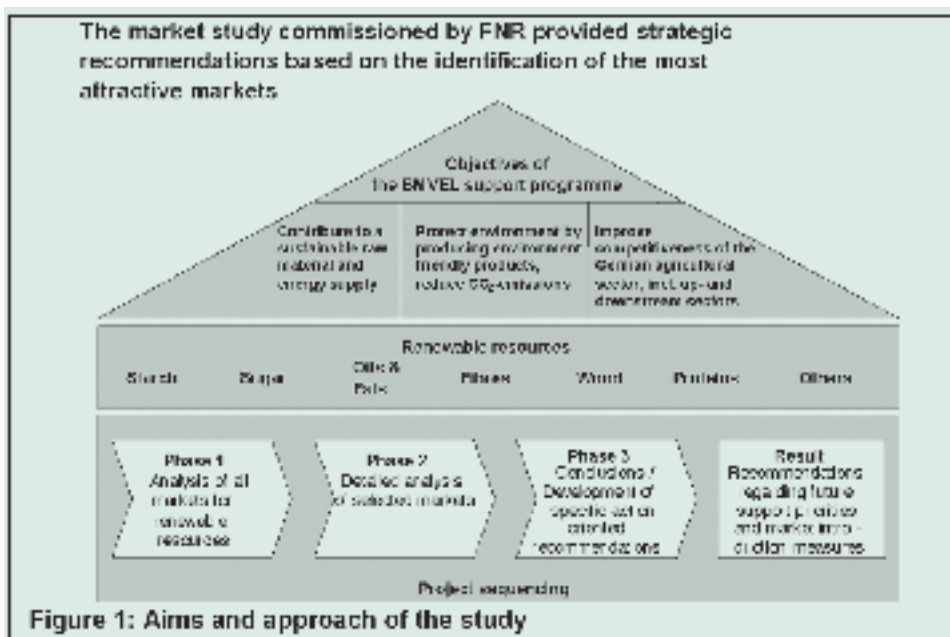
The valuation was carried out on the basis of general economic criteria like extent, growth, expectation of profits, tensity of competition, market access, necessary investments and sales potential. Also the quality of the product, value for money and connections to markets and customers played a role for the rating.

In Phase 2 of the project, selected markets have been assessed more in detail, and in phase 3 recommendations have been elaborated.

In 2006, the first part of the market analysis (phase 1, analysis of all markets) was published by the Fachagentur Nachhaltige Rohstoffe (FNR), the project promotion agency of the BMELV, who had been supervising the study. In 2007 the second part (phase 2 results) followed¹.

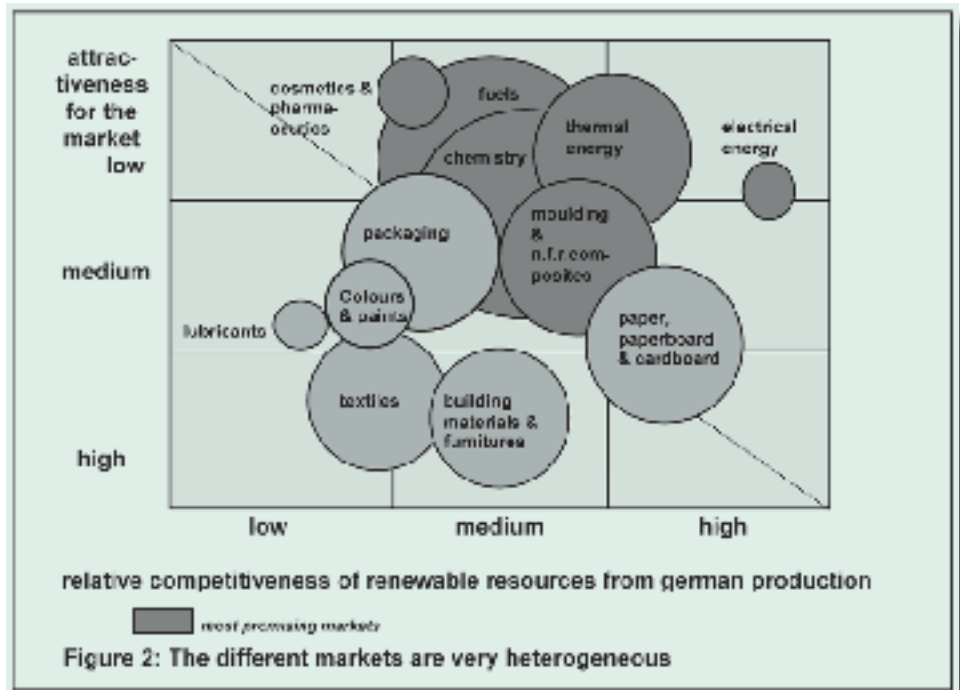
Results

In general, the study-authors arrive at the conclusion, that the different markets are very heterogeneous, regarding their competitiveness and attractiveness (Figure 2).



¹ "Marktanalyse Nachhaltige Rohstoffe", Teil I und II, FNR, 2006 bzw. 2007, to order on www.fnr.de, menu "Literatur"

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Some more detailed results are:

- The energy markets are the most attractive ones. They should form the main focus of political support activities, due to their extent, the high growth rates of renewable resources in this field and their contribution to greenhouse gas savings and sustainability. Last not least the high oilprices, increasing demand and the narrowness of oil reserves are playing an important role for the positive dynamic of these markets. Within the field of electricity, power derived from biogas from renewable resources has the highest dynamic of growth, thanks to the Renewable Energy Law. Generally, electricity generation is characterized through a relatively high competitiveness of german renewable resources. The same applies in the field of thermal energy - german renewable resources have a high

competitiveness. Wood chips and logs still offer additional potential in the production of heat. Bioethanol and medium-term BtL are the fuels with the highest growing potential, but necessity for support exists for both products along the whole value chain. The aim is to improve the competitiveness and to create an adequate legal and regulatory framework for the outlet markets. In contrast the market for Biodiesel is in a much advanced stage. Biodiesel has achieved already high market shares and overall, Germany is globally the largest biodiesel producer..

- The market volume for renewable resources in the chemical industry is already today high. Sugar and starch are the most important resources. The perspectives for the future are positive, but the promotion should focus on selected segments, f.ex. on the field

markets, resources and products are promising?

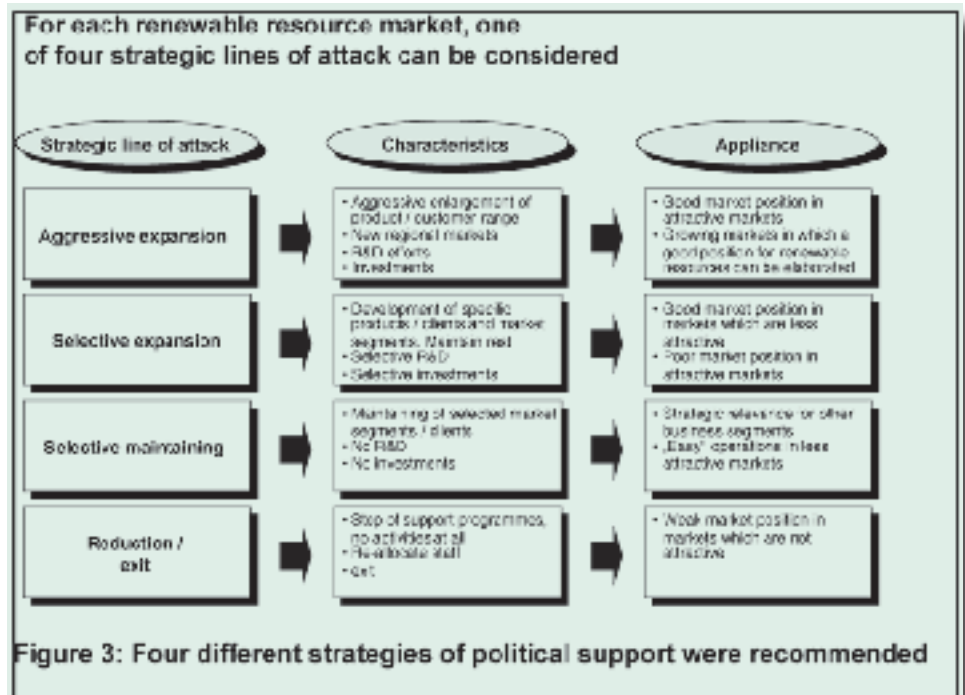
of White biotechnology, instead of the whole market.

- Wood as a building material is established and attractive. It doesn't need any promotion. Wood plastic composites and board materials instead have, if getting specific promotion, growth potential.
- Cosmetics & pharmaceuticals are experiencing a growing demand, but the international competitiveness of German farmers (e.g. herbal plants) is only moderate.
- In the lubricants market, better product qualities are not honored. Despite substantial governmental promotion activities the sales volume is still quite low. Lubricants made out of renewable resources are not competitive. Only in some markets (sensitive applications) they have achieved a certain market share. Therefore, it is proposed to focus the ongoing promotion measures on such attractive niche markets.
- In the market of colors & paints renewable resources are established, the studyauthors expect no dynamic growth in the future. Eventually the market segments of print colours and binders could be promoted with special measures.
- The established markets for paper, paperboard and cardboard are relatively big and due to the quite important transport costs for cellulose & pulp, advantageous for German suppliers. However this market does not feature a high growing potential and needs no special support measures.
- The products wooden pallets and wooden boxes are well established and produced from native resources. Promising new markets are packaging and mulch-foils.
- Moulding and natural fiber reinforced composites have chances to grow even stronger than the overall market

for packaging materials These products have developed their current market position practically without subsidies. They are established in the domain of automotive interior. High growth rates are expected for exterior, cases and for sport-, recreation- and game-articles.

- The market of textiles has been assessed as not attractive. Exceptions are fibers from dissolving pulp and cellulose, they are a growing market for short-lived nonwovenproducts and for the replacement of fiber glass in fiber reinforced composites.
- Up to now insulating materials from renewable resources can be sold only with high efforts in promotion. But against the background of an increasing need in energy savings this market has a high attractiveness.
- For furniture from wood, a well established domain, there is no need of promotion and research visible.

The authors end with some general conclusions. Basically, renewable resources have, due to high oil prices, narrowness of oil reserves and GHG savings an attractive position. However, international competitiveness of the German agricultural sector in several markets is not given. International competition is likely to increase as a result of WTO-negotiations,. In the EU context, German suppliers are often in a leading position. Nevertheless the studyauthors think, that a long-lasting future without subsidies is possible only with differentiated product characteristics, as for example "pharmaceuticals with biography", certificates, "green biofuels", special services or reliable delivery. A need for action is still existing in this context. A problem is the actual legal and regulatory framework, it often complicates the use of renewable resources in the different markets. These framework conditions should be



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Figure 4: Rating of the different markets according the four strategies

Strategy ► Market ▼	Aggressive expansion	Selective expansion	Selective maintaining	Reduction/ exit
Electrical Energy	forest wood		biogas	
Thermal energy		forest wood		
Biofuels	bioethanol BtL		biodiesel	pure plantoil biogas
Lubricants			<i>Sägekettenhaft</i> <i>und gatteröle</i> hydraulic oil lubricants	motor oil gear oil
Chemistry	starch/ sugar White Biotechnology	fats & oils cellulose		
Colors & paints			binder, solvents print colours. additives	plants to colourise
Pharmaceutics		pharmaceutic plants		
Paper, paperboard and cardboard				Mechanical wood pulp pulp
Packaging		packaging mulch foils/plant pots		wooden pallets and boxes
Moulding & natural fiber reinforced composites	gum articles cases	exterior and structure	interior	
Textiles		cellulose fibres		clothes home & technical textiles
Building materials & furnitures			kitchen-, modular furniture	building shell & solid building <i>Ausbau</i> insulating materials <i>hulk</i> <i>furnitures</i> (<i>Massenmöbe</i> !?)

improved to facilitate the future growth of the market shares of renewable resources. Finally the lack of consciousness and willingness of decision-makers to use

products from renewable resources is seen as a serious barrier. A "mental change" will be necessary, which is reachable with appropriate communication measures.

markets, resources and products are promising?

As a result and conclusion of their analysis the authors develop four strategies of political support and correlate each renewable resource market with one them. The results are shown in figure 3 and 4.

This classification should be helpful for a strategic choice for future investments in renewable resources. A necessary choice, not only on the level of each single project but also on the level of political promotion activities. Because the number of interesting markets is high and the available financial resources are limited.

**Nicole Paul, Fachagentur
Nachwachsende Rohstoffe e.V. (FNR)
and Dr. Norbert Schmitz,
meó consulting team; Germany**

Entsprechend der Bewertung der einzelnen Marktsegmente können unterschiedliche strategische Stoßrichtungen in Erwägung gezogen werden.

Strateg. GFI Aktivitäten	Starker Ausbau	Selektiver Ausbau	Selektive Halten	Reduktion / Ausstieg
1. Elektrische Energie	- Wasserkraft - Upcyclingnutzung		- Biogas	
2. Thermische Energie		- Waldholzverwertung		
3. Treibstoffe	- Bioethanol - BtL		- Bioöl	- Pflanzenöl - Biogas
4. Schmier- u. Werkstoffe			- Schmier- u. -additive - Schmier- u. -hydraulische	- Mikroadditiv - Spezialöle
5. Chemie	- Saft/Zucker - WäSSE-Technologie	- Farbstoff - Cellulose		
6. Farben u. Lacke			- Dispersions-, Lösungsmittel - Druckfarben, Additive	- Farbpflanzen
7. Kosmetik u. Parfüm		- Arzneipflanzen		
8. Papier, Karton, Pappe				- Holzwerkstoffe - Zellulose
9. Verpackungsmittel		- Verpackungen - Müllsäcke / Filtertüche		- Holzpaletten und Glaser
10. Formteile	- Gehäuse - Spezialwerkstoffe	- Dekorativ und Struktur	- Interieur	
11. Textilien		- Cellulosefasern		- Bekleidung - Heim- u. techn. Industrie
12. Baumaterialien/Möbel			- Kleben-, Systemwerkstoffe	- Holz- und Massivholz - Ausbau, Einbaumöbel - Massivmöbel



ROQUETTE: New Industrial production of Isosorbide

Isosorbide may be described as the most promising diol of renewable origin on account of the very unique and exceptional nature of its properties.

It enables for example a considerable increase in the heat resistance of polymers such as PET (polyethyleneterephthalate) and consequently a broadening of their range of applications (for hot-fill containers in particular).

Isosorbide can be substituted for other diols in order to create new polyesters, polycarbonates and polyurethanes that are partially or even completely bio-based.

Isosorbide is obtained from Sorbitol which itself comes from cereals. As the leading world producer of Sorbitol, ROQUETTE has for many years now, made Isosorbide a key part of its innovation strategy.

In order to support the new developments, last April ROQUETTE launched a new Isosorbide industrial unit in Lestrem (France) with a production capacity of several thousands of tonnes per annum.

This unit will fulfill the drastic demands of the polymer industry with a specific grade POLYSORB®P.

In addition to making this investment, ROQUETTE has recently acquired the exclusive World rights to a patent of the DuPont Company covering an Isosorbide of the high purity that is required for the applications in the polymers area.

Lastly, ROQUETTE has just received the positive opinion from the EFSA (European Food Safety Authority) for the use of Isosorbide as a monomer for PET dedicated to food packaging.

Thus Isosorbide can henceforth be considered as a "green" diol for the food-packaging sector, a sector that is in the full throes of expansion and intent on using materials of an agricultural origin.

In addition to these polymer fields, Roquette is developing derivatives of Isosorbide, in the form of Isosorbide Diesters for PVC plasticizers as a substitute for phthalates, and in the form of Dimethyl Isosorbide as a "green" solvent for the industrial sector. All these Isosorbide developments in the chemistry field are included in the BioHub® programme, a programme that is backed by the French Industrial Innovation Agency and of which Roquette is the leader.

In this respect Isosorbide is now to be considered as a new chemical platform of interest as it comes from renewable resources and gives access to many derivatives with properties

on a par with or even superior to, their counterparts in the petrochemical industry.

With this significant investment ROQUETTE is demonstrating tangible commitment towards its innovation efforts and promoting the use of renewable resources for Chemistry.

Isosorbide perfectly illustrates the new "vegetal based chemistry".



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Publisher and Editor

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ESENES designed communication
Standerdmolen 8-030, 3995 AA Houten, The Netherlands