

From Mining To Refining

Innovative concepts for making the most of lignite

Taken together, the chemical industry and the production of raw materials provide jobs for more than 27 000 people, generate over €9 billion a year in turnover and contribute 17% to the gross value added chain. In short, they are the industrial backbone of central Germany.

Sharp price rises and the severe dependence on outside sources of oil and natural gas have meant that the chemical industry has become increasingly interested in the use of alternative raw materials in recent years. Aside from price stability and consistent quality, security of supply is also a major concern. So it's no surprise that lignite, also known as brown coal, has come back into focus as a raw material for use in the chemical industry. After all, it's native to central Germany. Even so, a huge effort will be required to bring an industry that has been neglected for many years up to the latest technical standards.

Beginning in 2008, 12 companies with deep roots in the Halle-Merseburg-Leipzig region have come together to develop new technologies for making the most of local lignite. A concept was presented in mid-2010, and the Federal Ministry of Education and Research (BMBF) rated

its chances of realisation highly enough that it allocated about 14 millions of Euros in support for the project.

The alliance of companies will now begin to bring the individual processes – from the deposits via mining and processing through to material use (extraction, catalytic cracking, gasification) – together into a lignite chemical industry park. The organizations in the park will work on minimizing waste products and reducing impacts on the environment, all the while paying close attention to efficiency. In addition to developing a range of new technologies, systems and processes, the alliance will also collaborate on integrating them on an industrial scale.

The result of this integration of the lignite industry with the chemical industry (ibi – Innovative Braunkohlen Integration in Mitteldeutschland) is to be the first large-scale realization of this concept, to be located in Leuna by the year 2020. Central Germany has the chance to become world leader in services, processes and systems relating to the future use of lignite.

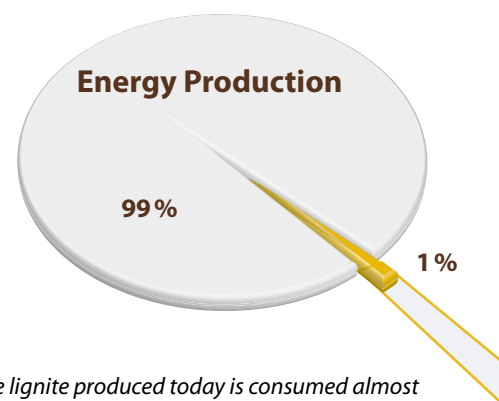


The first large-scale project for using lignite as a chemical raw material is to be realised in Leuna, a traditional centre of the chemical industry.

Lignite as a chemical raw material – a misunderstood tradition

A vibrant chemical industry began to develop in central Germany about a century ago and still today forms the backbone of the economy in the region. A major contributing factor to the birth and growth of the industry was of course the abundant local supply of lignite, and a number of innovative processes enabling it to be used as a chemical raw material were first applied on an industrial scale here in the region. For example, there was the production of synthetic gas from coal, followed by the Fischer-Tropsch process synthesizing hydrocarbons.

As oil and natural gas rapidly developed after the Second World War and the chemical industry shifted production onto this basis, lignite became less important as a resource. Research into new processes and techniques was neglected and, after a brief renaissance at the beginning of the 1970s, lignite was largely forgotten as a chemical raw material. One exception here is ROMONTA GmbH, which produces montan wax from local lignite by extraction.



The lignite produced today is consumed almost exclusively in electricity generation. In fact, less than 1 % of all lignite mined around the world is used as a chemical raw material. One of the few places where it is utilized in this way is here in central Germany. ibi is an alliance of companies which have come together to make the most of the vast local potential and to advance the exploration, refining and processing of lignite.

*The tradition to use lignite as raw material dates back almost 100 years:
Producing montan wax by extraction at ROMONTA in Amsdorf (Photo: G. Saray).*



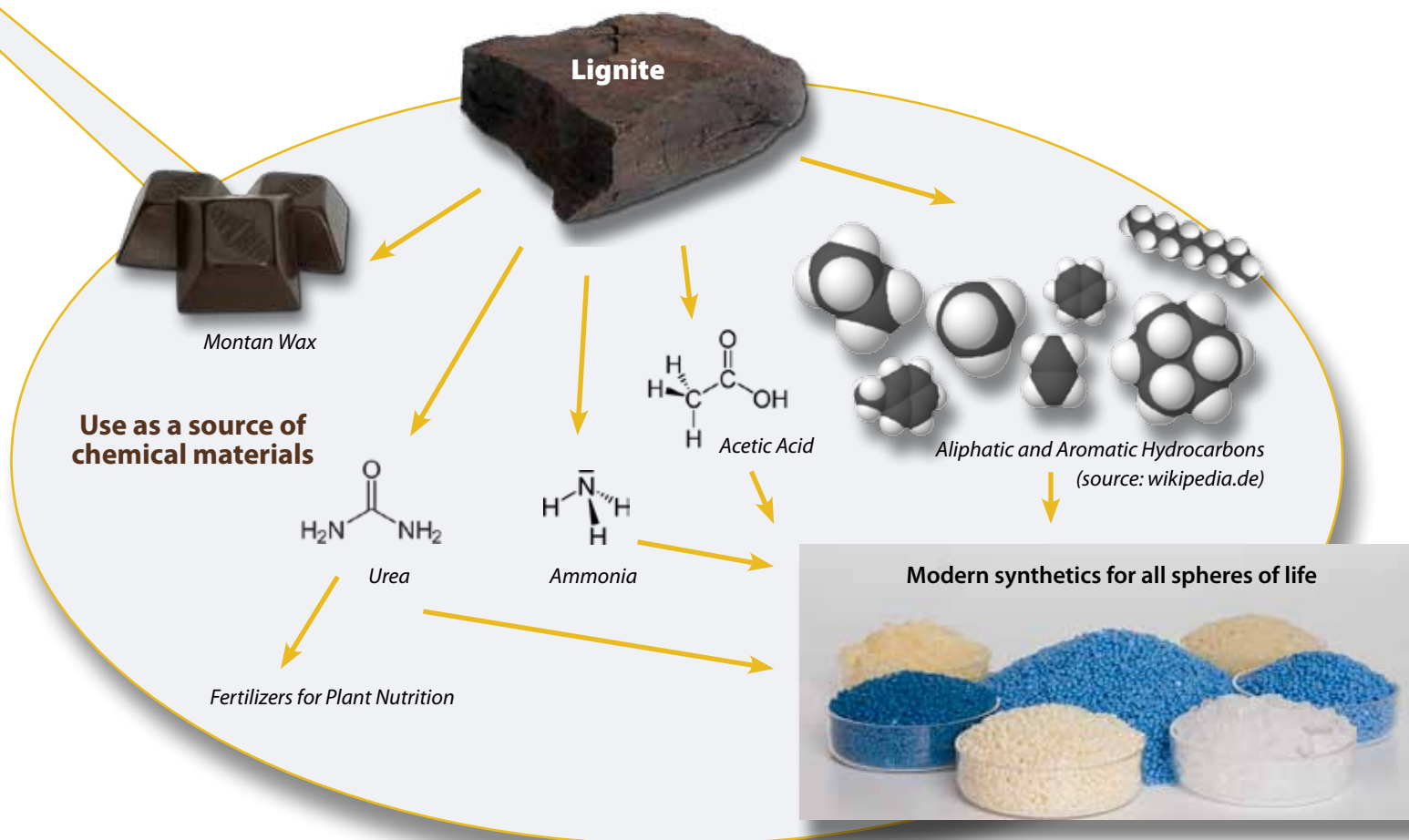
Adding value by integrating processes

The focus of the ibi alliance is on obtaining chemical raw materials from lignite, whereby the greatest attention is paid to using the chemical compounds that are already present in the coal. So that efficiency is kept at the maximum and the added value is the greatest possible, an integrated chain needs to be developed from the coal deposits through production and on to refining. A cascade of lignite refining processes is one of the unique features of the technology partners grouped together in the alliance.

Chain of processes and reactions



By using local lignite, the region's contribution to the value added chain can be increased significantly. In addition, the chemical industry's security of supply is raised and the innovations made will benefit local engineering companies specialising in chemical and mining technologies, reinforcing their position on the global market.



A concept this comprehensive can be cost-effective, especially in the development phase, only if the best use is made of structures already available in the chemical industry park. Tie-ups with existing users of chemical precursor products support the local economy and safeguard jobs. By integrating the processes and arising energies using lignite as a chemical raw material, the emission of greenhouse gases in the chemical processes can be significantly reduced as the transfer of carbon from the coal into the end product can be achieved with a minimum expenditure of energy. The high degree of integration means that using lignite as a chemical raw material in a lignite chemical park is already cost-effective today.

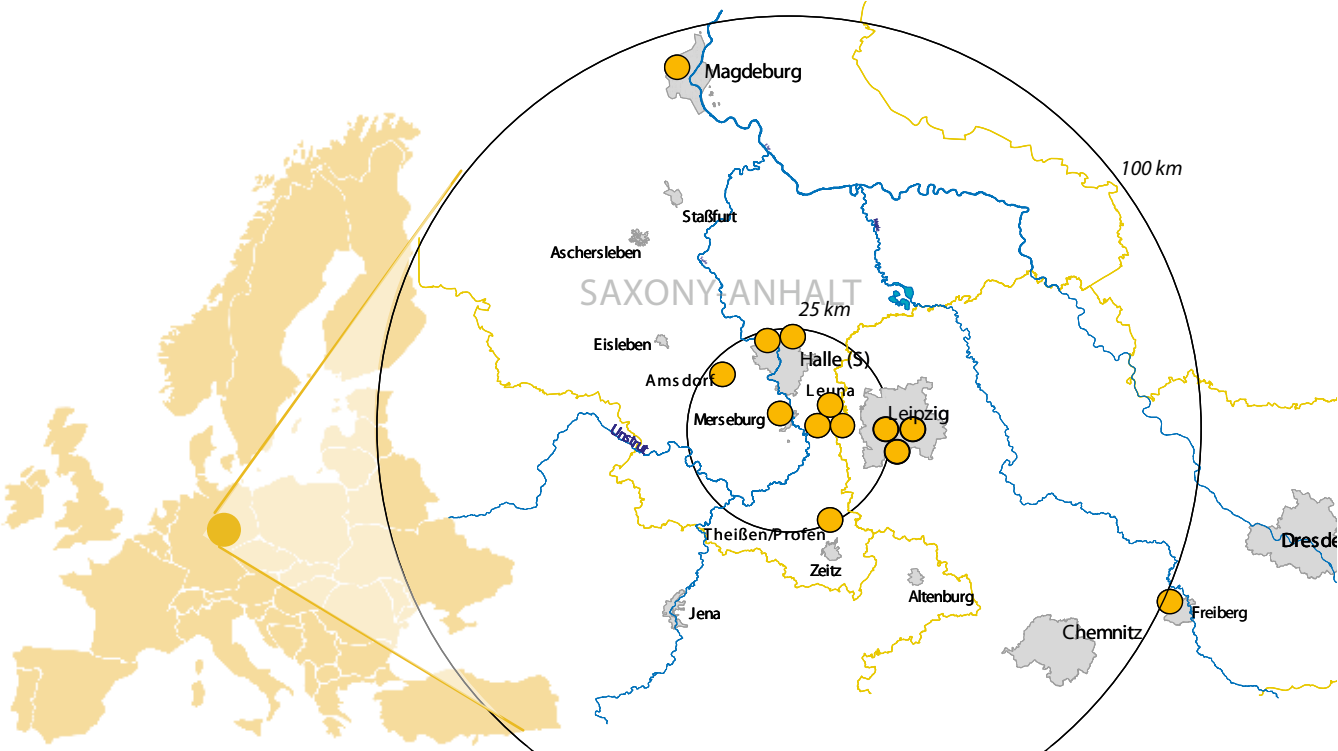
The ibi alliance – effective partners in the region

The ibi alliance consists of 12 strong partners from the worlds of business and research who bring together expertise in three fields – lignite mining, the chemical industry and engineering. This combination, together with the knowledge available at local universities, is the central component in the project to develop the use of lignite as a chemical resource.



The ibi network

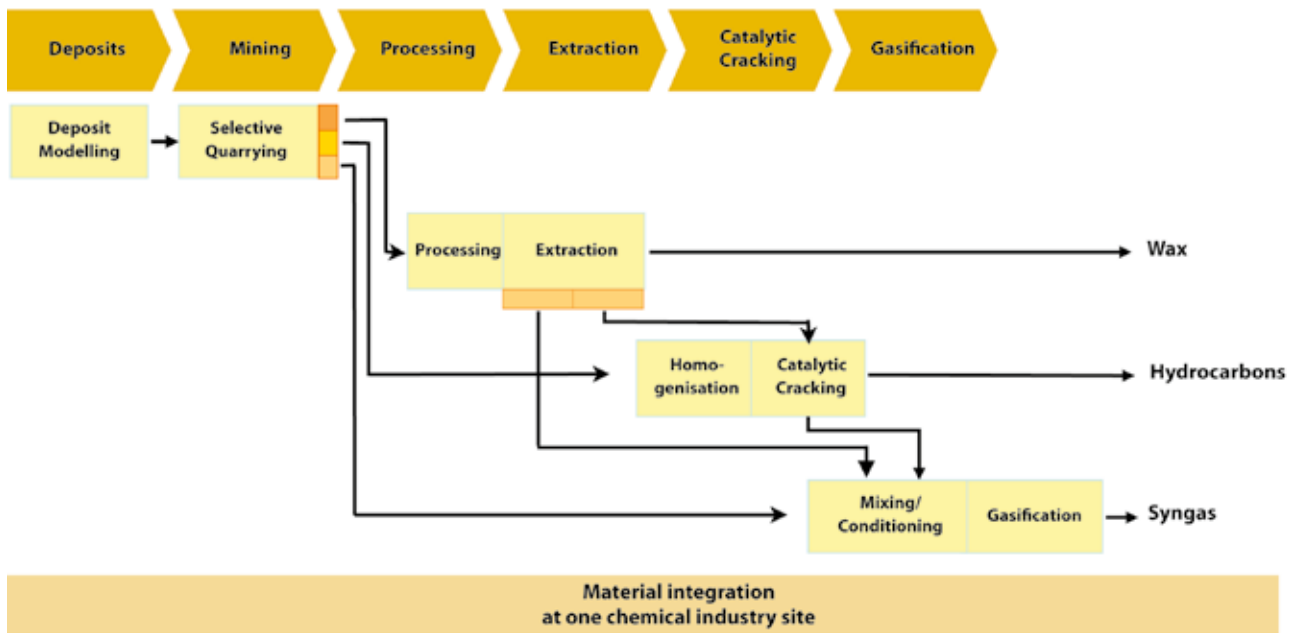
The alliance plays an active role in boosting growth and safeguarding jobs in the region. The main contribution to achieving will be made by using local lignite as a chemical raw material as this will ensure that a greater portion of the value added chain remains in the region.



Basic chemicals produced from central German lignite

In the future, the world will need processes, technologies and facilities which can make alternative sources of hydrocarbons accessible to the chemical industry. With regard to efficiency and cost-effectiveness, a particularly important role will be played by complete solutions which take into account the whole spectrum of coal's properties, starting during the mining and continuing through to the refining process.

Today's plant and processing technologies are not completely developed, however, and are limited to a few special applications. There is a severe shortage of up-to-date knowledge, particularly in the field of integrated process chains making the most of coal as a chemical resource.

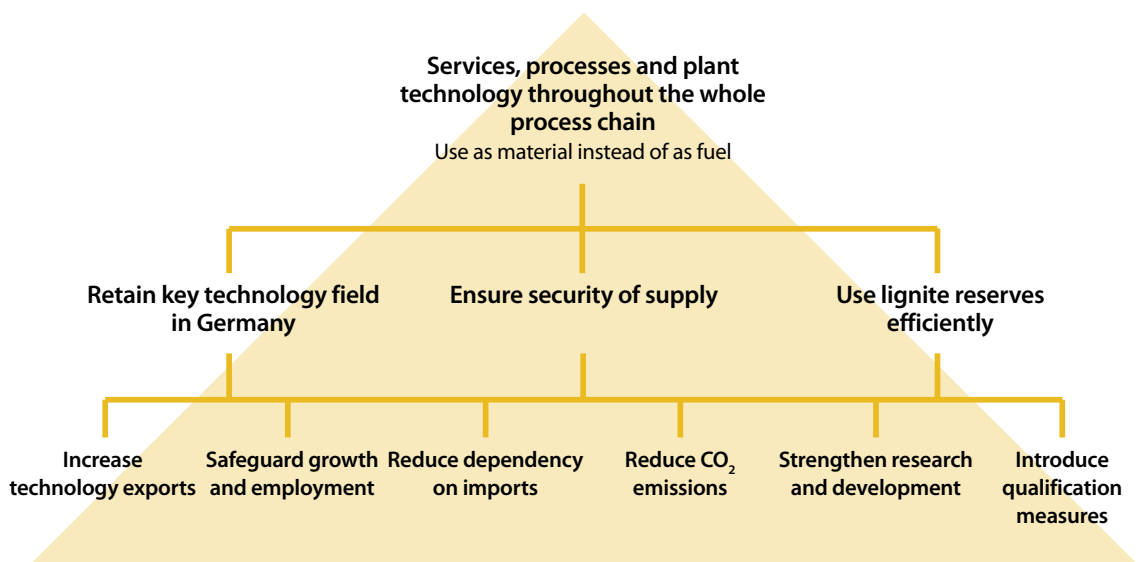


The ibi alliance's aim is to attune the individual modules in the process chain to the interaction between the chemical and plant parameters in such a way that the solution developed can be adapted to any number of clients operating under differing conditions.

As well as complete solutions, the alliance plans – initially within the next 5 years – to develop and

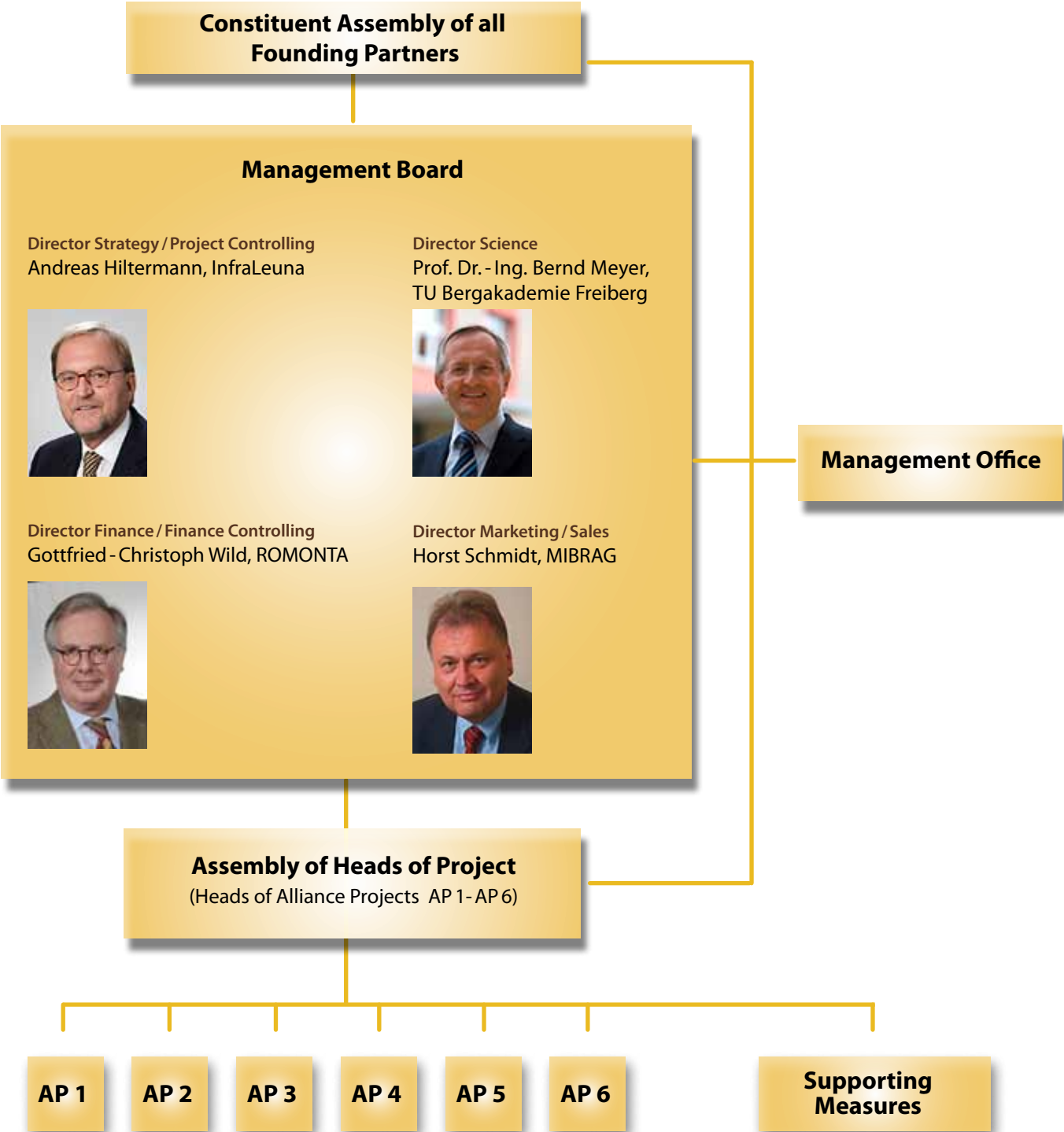
market process technology, plant system and also service components.

It is planned for the first large-scale project for using lignite as a raw material for the chemical industry to be established and operated in Leuna, a traditional centre of the industry, by the year 2020.



Strength through diversity – the alliance management

The alliance has defined an organisational framework in order to facilitate communication with potential clients and the public. A management board is supported by the heads of the alliance’s different projects to ensure that communication is reliable and that information is readily available.



Organisation of the ibi alliance

The alliance’s goal is to become a one-stop shop for a range of technical concepts. In addition to a website and an e-mail contact address, the alliance will shortly be opening a management office to coordinate its contacts with outside parties. The alliance invites all interested partners to join it in the development and implementation of its new approach (contact: info@ibi-wachstumskern.de).