

# >> THE FUTURE OF PAPER: BLACK ON WHITE. A PLAN FOR ACTION.

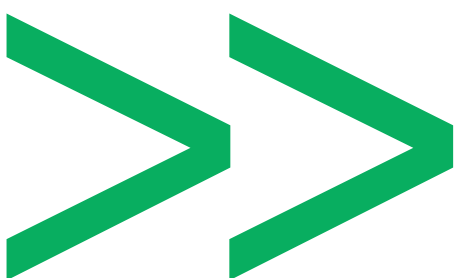
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Sustainable services and suggestions for the paper industry in Germany

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# >> SUSTAINABILITY FOR A **SECURE FUTURE.**

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The German pulp and paper industry faces a raft of challenges. Like all energy-intensive industries, it has to manage the vast uncertainty surrounding the shift to renewable energy. Luckily, the legislature has introduced partial exemptions from the EEG surcharge and other tax benefits. If this relief is eliminated due to changes in government, however, the entire industry could be threatened.

Sluggish consumption has affected many industries, but new media consumption habits have put an additional burden on the pulp and paper sector. It is obviously the first industry affected by the decline of print media. Admittedly, demand for cardboard and packing paper is rising due to the rapid growth of online retailing. Paper-based hygiene products are also growing, probably driven by demographic change. Many medium-sized companies, however, are so specialized that they cannot readily switch to other products in order to offset the slump in newsprint and graphic paper. Despite these difficulties, the pulp and paper industry has every reason to be optimistic about the future. Surprisingly for an industry that has always been deeply committed to sustainability, it stands to gain the most from introducing even more sustainability to its management practices, particularly in site management. This fact has not been lost on European paper manufacturers, who have plotted a path to a successful future: the 2050 Roadmap of the Confederation of European Paper Industries (CEPI). As a leading chemical and pharmaceutical site operator, Infraserp Höchst is in a prime position to help the paper industry leverage these opportunities.

We hope you find this white paper not only informative, but also inspiring.



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HEAD OF BUSINESS DEVELOPMENT



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# >> THE PAPER INDUSTRY IN GERMANY: AN INDUSTRY AT THE CROSSROADS.

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The Federal Republic of Germany's energy goals revolve around efficiency, supply reliability and the environment. For example, it plans to upgrade 1,834 km of transmission lines in order to connect offshore wind parks to the rest of the grid. It intends to keep industrial electricity rates within 8.5% of the EU average. It wants the surcharge for developing renewable energy to be no more than 3.5 ct/kWh by 2020. And it aims for CO<sub>2</sub> emissions to fall 40% from 1990 levels during the same period. This corresponds to a 20% reduction in primary energy consumption over 2008, even though electricity consumption only fell 10% during the reference period.

These are ambitious goals, and McKinsey is already calling some of them "unrealistic" in its Shift to Renewables Index (Energiewende-index) due to poor implementation. Manufacturers, for their part, will have to show considerable initiative and willingness to change. Luckily, the law provides significant incentives for renewable energy initiatives. For example, the consumption-based partial exemption from the EEG surcharge and other forms of tax relief granted under German Electricity Tax Act (StromStG) §9 b and German Energy Tax Act (EnergieStG) §54 reward companies for having certified energy management systems. Energy is clearly important for the paper industry, with its high power and steam consumption. While the public and media remain fixated on the raw materials side of paper processing and production, the German paper industry has been quietly moving in the right direction on the energy front: Effective energy management systems are already standard practice at many companies.

The industry's energy programs qualified for EUR 300 million in tax relief just for 2011 – half of the industry's EBIT in 2012.<sup>1</sup> The relief is not guaranteed over the long term, though, given the vast costs of shifting to renewable energy. The green energy revolution affects the paper industry in another way, too: With its fast-running, energy-intensive equipment, it is more dependent than most other industries on grid stability. As a result, it will have to make additional investments to absorb potential voltage fluctuations caused by volatile renewable energy sources.

## JOINING FORCES ACROSS EUROPE

The Confederation of European Paper Industries (CEPI) set concrete goals and identified opportunities for action in its 2050 Roadmap. For example, it forecasts that fossil fuel consumption in the forest fiber sector will fall 80% by 2050, even as the value of paper and paper-based products increases considerably. The increase will make up some, if not all, of the ground lost over the past two decades, as prices fell and production volumes rose markedly in Germany.

According to the 2050 Roadmap, manufacturers will only survive and thrive if they implement modern technologies such as renewable energy instead of fossil fuels. The roadmap also forecasts a fundamental structural change. Tomorrow's paper producers will be the focal point of an integrated production environment; instead of isolated suppliers, they will act as providers of end-to-end value chains. At the same time, they will play an increasingly active role in managing energy within their economic spheres of influence – as suppliers and customers alike. The industry association can only make suggestions and give direction, though; it is up to the individual companies to take action on their own or in a regional alliance with other firms. And so manufacturers will, according to the roadmap, need to set aside enough cash to make the not inconsiderable investments needed to benefit from the upcoming changes.

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<sup>1</sup> 2012 industry revenue of EUR 15 billion with an average EBIT margin of 4% translates into an industry EBIT of EUR 600 million in 2012. Calculation based on ipwonline.de (VDP – Energy change and iPad & Co. are causing the most concern; by Monika Lier).

## CONSOLIDATION CONTINUES

Germany is a world leader in per-capita paper consumption: 243 kg per year. The US, by comparison, only consumes 231 kg per person and year. Export rates are growing, too – not a bad outlook for the industry as a whole. The story is more nuanced at the level of the individual company, though. Germany’s annual output of 23 million tons of paper is spread among 100 companies at 160 sites. 13 of these manufacturers produce over 500,000 tons per year and account for two-thirds of the total. Half of the producers are much smaller: 49 of the 100 companies manufactured less than 50,000 tons in 2011. The industry, in other words, appears to be consolidating. This analysis is borne out by changes in the number of facilities over the last 20 years. Following a massive decline from around 290 to approx. 180 between Germany’s reunification and 2000, the number of facilities stabilized briefly and then resumed a steady decline in 2005.

### IN 2010, 100 PAPER PRODUCERS GENERATED EUR 15 BILLION WITH 23 MILLION TONS OF PRODUCTION OUTPUT

ANNUAL CAPACITY	NUMBER OF COMPANIES	PRODUCTION OUTPUT	
< 50,000 t/a	49 (– 9 vs. prior year)	886	10 <sup>3</sup> t/a
50,000 to 100,000 t/a	13 (+ 5 vs. prior year)	819	10 <sup>3</sup> t/a
100,000 to 250,000 t/a	17 (– 6 vs. prior year)	2,990	10 <sup>3</sup> t/a
250,000 to 500,000 t/a	8 (+ 1 vs. prior year)	2,837	10 <sup>3</sup> t/a
> 500,000 t/a	13 (+ 1 vs. prior year)	15,666	10 <sup>3</sup> t/a

Source: 2011 VDP Paper Report

Clearly, an industry that is dominated by small and medium-sized businesses, under enormous pressure to innovate and subject to high investment costs in its core business will not have much profit left over to invest in non-core processes. Having said that, the optimization of energy consumption, waste logistics and biomass recycling is not only possible; it is absolutely essential.

## ROADMAP FOR INDIVIDUAL COMPANIES

Eventually – as confirmed by the CEPI roadmap – structural change will come to the German paper industry’s production sites as well. This should not provoke any pessimism about the future, though. Companies simply have to identify structural changes that they can roll out at their site or in their region. Plant closures are neither inevitable nor do they become necessary overnight. If industry players lay the right groundwork in time, they will have plenty of opportunities. As the roadmap says, as long as small and medium-sized companies can raise the funds to invest in structural change, they will find local markets for specialized conventional and biomass-based products. These biomass-based products will include fuels generated through recycling in conjunction with paper production. Being energy-intensive, paper production can also play a large role in actively helping to stabilize the grid and making the shift to renewable energy successful over the long term.

Companies interested in realigning their operations will have to take the first step themselves. If they yoke their expertise in biomass and recyclable material processing to a site service provider’s knowledge and experience in logistics, recycling and energy optimization, they will have taken the right step forward to a successful future.

# >> WE ENABLE SITE EXCELLENCE.

From a site service provider's perspective, the paper industry has unleveraged potential in three fields: providing an efficient, highly available supply of utilities, optimally recycling production waste biomass, and introducing open, modular structures into the site's organization.

## MANAGING THE SHIFT TO RENEWABLES

Grid stability represents one of the biggest unresolved challenges in transitioning to a renewable energy economy. Society will only accept generous subsidies for renewable energy sources if all of the resulting electricity is actually used. Once enough green energy comes online, it will compete with conventional source electricity. That is the intention, after all. Unfortunately, Nature does not supply energy on a pre-determined schedule. Conventional source electricity has to be constantly added or removed from the grid in order to balance electricity supply and demand. If this is not done, grid voltage could become unstable, which could have a devastating impact on the production process.

This is exactly where Infraser Hochst's approach can help stabilize the grid. It promises not only greater supply reliability, but lower production costs as well. All it requires is a deeper understanding of how to utilize large-scale utility and production infrastructure. Essentially, it involves participating in the control power market – a mechanism for avoiding grid volatility by generating or removing a specific amount of electricity. Infraser Hochst has already developed the technology at Industriepark Hochst and can apply it to the paper industry once a large enough scale has been reached.

The technology can remove a significant volume (over 5 MW) of surplus electricity from the power grid and utilize it productively with less than 5 minutes' prior notice. In the control power market, this is known as "providing negative secondary control power". The paper industry is certainly willing to apply new technology to opportunities opening up in the changing energy market, as evidenced by all the refuse-derived fuel power plants and gas turbines that are already helping to supply the paper industry with economical, uninterrupted electricity.

## OPTIMIZING THE UTILITIES SUPPLY

Even if manufacturers do not make wide-reaching investments, Infraser Hochst can still contribute its extensive experience as the operator of Industriepark Hochst to making the supply of utilities at paper-producing sites safe, reliable and efficient.



FACTS AND FIGURES AT INDUSTRIEPARK HOCHST	
• Companies at the park	90
• Employees	22,000
• Total area	460 ha
• Power consumption	1,800 GWh/a
• Heat consumption	2,850 GWh/a
• Power lines	983 km
• Supply lines for hydrogen, steam, nitrogen, various grades of air, condensate, natural gas	478 km

Our utilities expertise ranges from infrastructure design and optimization to the strategic alignment of procurement and utility infrastructure to operational procurement and regulation management. We can supply electricity, biogas or natural gas and operate energy generating units. Our portfolio includes a wide range of consulting services, too: assisting with the assessment of specific investment projects and proposals, conducting energy savings studies, supporting roll-outs or refining energy management systems in accordance with DIN EN ISO 50001, which we have been complying with since 2009.

## LEVERAGING THE POWER OF RECYCLING

Waste disposal may only account for 3% to 8% of total expenditure, but even small costs add up quickly. Some producers may be surprised at the enormous potential unleashed by highly focused recycling. While large paper plants may have co-generation systems or even digesters, many smaller sites incinerate their waste without extracting every quantum of energy out of it first. This is a waste of money. They may have gotten rid of their refuse and covered some of their steam needs, but they are still wasting energy resources. Incinerating aqueous waste in particular – a common byproduct of paper production – is usually not the best solution.

Industriepark Höchst is a prime example of how to seamlessly integrate waste disposal and energy production through rigorous recycling. Wastewater is first purified in a two-stage biological wastewater treatment plant, one of the largest of its kind in Germany. Wastewater and aqueous waste is accepted as long as producers provide enough information on the originating processes to ensure the biodegradability of the waste.

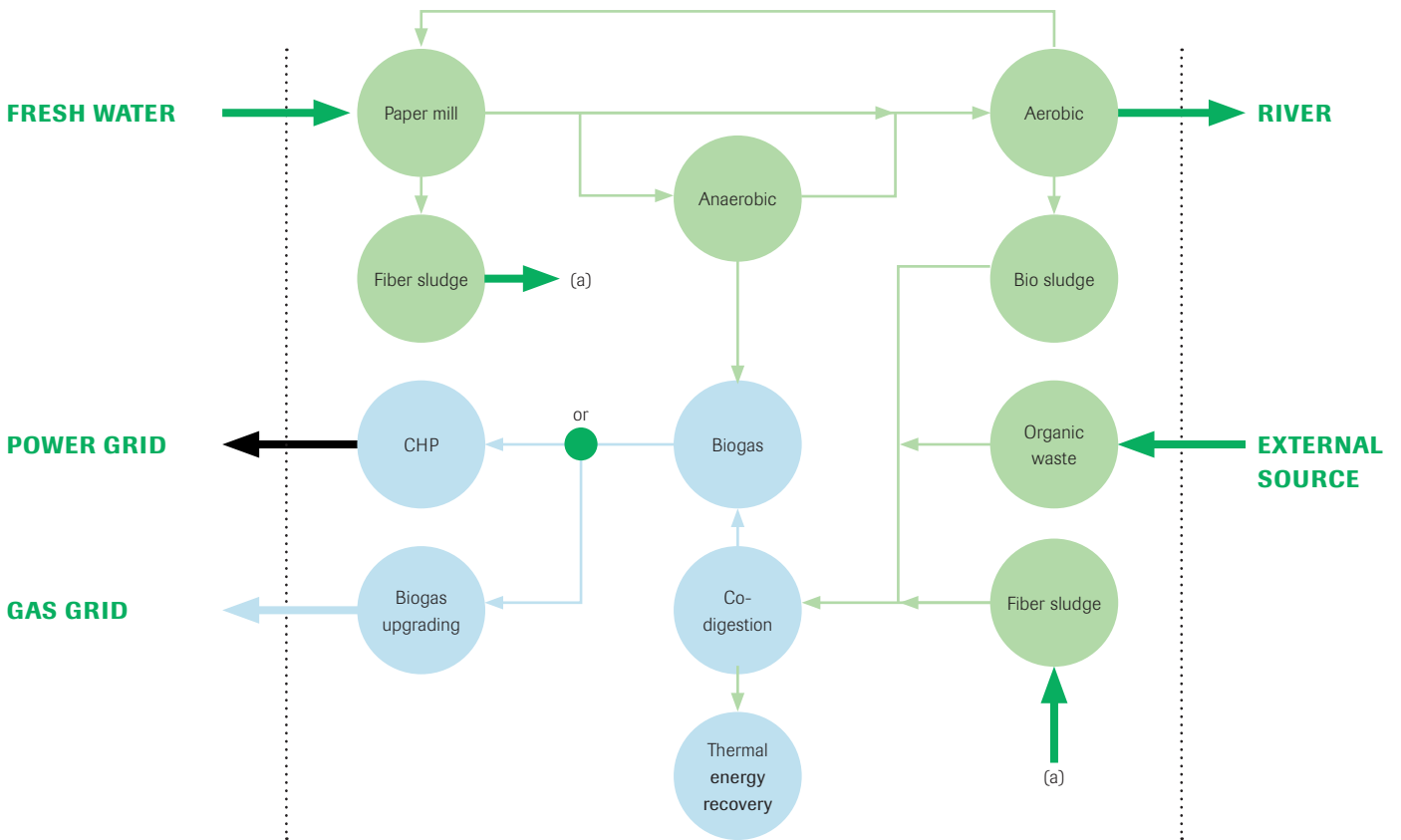
The end result of this process is sewage sludge, which is not only burned as fuel at the end of the recovery chain, but also digested to generate valuable biogas. This requires a powerful biogas plant as well as the right “cocktail” – a mixture containing other organic wastes such as grease trap refuse, mother liquors and solvents. The biogas serves as fuel for generating heat and electricity at Industriepark Höchst. The remaining biogas is upgraded to biomethane and fed into the public gas grid. All the formalities and arrangements involved in this process are handled by InfraserV Höchst.

Sewage sludge, fluidizable bulk solids and any other waste that cannot be used to produce gas is incinerated in one of Europe’s most advanced sewage sludge incineration plants. We also dispose of selected hazardous waste alongside high heat value waste fractions (e.g. from paper production). This allows sewage sludge to be incinerated with minimal environmental impact. Long-running operating permits combine high disposal reliability, strict compliance and high plant availability.

Over the medium to long term, a paper mill might implement the closed substance cycle illustrated on the next page. Merely eliminating garbage trucks would not only significantly lower CO2 emissions, but also improve local traffic volumes – and earn even more corporate citizenship points.

The digestion “cocktail” has to be assembled with the help of an external provider such as InfraserV Höchst, who has decades of experience and access to a wide range of waste from all its customers.

## CLOSED SUBSTANCE CYCLE FOR A PAPER MILL



## PRACTICAL SCENARIOS FOR CUTTING-EDGE WASTE DISPOSAL SOLUTIONS

Investments to improve energy yield may not pay for themselves during the standard planning horizon of a medium-sized paper producer. In this case, manufacturers can turn to a specialized site service provider. As with grid stabilization, Infracorv Höchst will act as an innovator, operator, technology supplier and investment partner. Its proven approach can take three different forms. First, paper mills located near Industriepark Höchst can utilize the park's infrastructure. Direct highway access, ten delivery gates and an express gate help keep waste logistics running smoothly for safe disposal at all times.

Outside the Höchst catchment area, it may be more beneficial to implement the technology as a centrally located "waste disposal cooperative" that serves multiple sites. Energy produced from the waste would be exported into the public grid. Large paper mills may prefer to implement a fully-fledged closed substance cycle within their own site over the medium term, especially if they are making future site plans with other power consumers in the immediate vicinity.

An astute reader may object that waste management is far from a paper producer's core business. This is why it only makes sense to bring in a specialized service provider to dispose of production waste safely, efficiently and environmentally responsibly. Infracorv Höchst can handle every step in waste management – from local collection and storage with existing personnel to identification of the best disposal methods to low-cost, legally compliant waste disposal. The service package includes keeping records of proper waste management and clearing the records with government agencies as well as handling logistics, analysis and documentation.



# >> OPTIMIZATION AND DEVELOPMENT IN GERMANY:

Infraserv Höchst's specific expertise can boost productivity and cut costs in many areas, not just energy management and waste disposal. The specialized service provider can leverage its cross-industry experience to develop innovative plans for instituting and managing unavoidable structural change.

## FOCUS ON CORE BUSINESS

Cost optimization is the overriding priority for many paper manufacturers. And the first step in cutting costs is to put the focus on core business processes. Numerous companies, however, have to reduce their oversized workforce following years of declining demand and the introduction of productivity-boosting technology. At the same time, they need to retain highly skilled core personnel in order to maintain their ability to grow and compete in the marketplace. In these cases, it is often more efficient to outsource secondary processes to a specialist who can perform them much more productively. This way, the paper manufacturer can define, refine and operate its own vertical production system and leave the rest to the service provider.

Far more secondary processes can be outsourced than just utilities and waste management. Infraserv Höchst has an unparalleled depth and breadth of expertise and experience in many disciplines: from efficient supply chain design to end-to-end plant and infrastructure operation, from environmental protection to preventive health protection for employees. Infraserv Höchst integrates all these processes safely, efficiently and sustainably to unleash synergies in all the industries it serves. This end-to-end service concept is known as being "infraserviced".

### SITE SERVICES

- Employees
- Plants and equipment
- Facilities
- Infrastructure
- Environment



### UTILITIES

- Electricity
- Natural gas
- Cooling
- Heat
- Water



### WASTE MANAGEMENT

- Wastewater
- Biogenic waste
- Refuse-derived fuel
- Hazardous waste
- Sewage sludge



### LOGISTICS

- Inbound
- Onsite
- Warehousing
- Freight services
- Training



## **INFRASTRUCTURE CONSOLIDATION**

A growing chorus of experts believe that infrastructure will increasingly consolidate across industry lines in Germany in the future. And for good reason, too. Small sites often stagger under disproportionately high infrastructure costs. Large industrial sites, by contrast, offer enormous cost advantages with large user pools and shared infrastructure. Communal energy generation, for example, ideally linked to an integrated waste management system, makes economic and environmental sense. If the geography is not favorable enough for communal generation, paper producers and other manufacturers can still form local waste management cooperatives in which they incinerate waste in a state-of-the-art energy recovery facility that is equally accessible to all cooperative members.

A service provider like Infracorv Höchst can contribute more than just know-how to this arrangement. It could supply material input such as waste from other industries to optimize the digestion cocktail for biogas generation. It has the extensive, longstanding site operation experience to operate the complete plant and handle the associated logistics, too.

## **A NEW ROLE FOR THE FOREST FIBER INDUSTRY**

The site environment will change even more radically over the long term. The 2050 Roadmap traces a relatively clear picture of the future of the forest fiber industry. More value-added will come from developing innovative products and optimizing material consumption. This includes not only a significant increase in recycling rates, but also new, lighter packaging materials with a higher value per ton. Demand for high-quality paper-based hygiene products will rise, largely fueled by demographic change, while deeper specialization in graphic papers will generate more value. More business opportunities will arise from biomass-based products and business models, especially in the energy sector.

Most sites will only reach this stage of development if they are fundamentally reorganized. Specialized site service providers like Infracorv Höchst can do much to ensure that the industry overcomes the challenges associated with change while focusing on its core competencies.

## **INTEGRATION AND SPECIALIZATION**

Due to these trends, the roadmap predicts that sites will consolidate into three typical models, although competitors may still share individual infrastructure assets to optimize capacity utilization. First, wood-based biorefinery complexes will produce pulp, paper, board, bioenergy, biofuels, bio-composites and bio-chemicals. Most will be located in rural regions, providing valuable green-collar jobs. Second, recycled fiber-based biorefinery complexes will also produce pulp, paper, board and biofuels. However, they will operate in symbiosis with other industries as supply chain partners at integrated complexes. Farmers, waste management firms, chemical companies and energy producers will use shared infrastructure or will process waste and wastewater from the forest fiber industry into valuable commodities such as fatty acids, molded products or insulation materials. Third, some facilities will remain non-integrated: sawmills, wood product and paper mills that provide peak capacity and optimum use of raw material at various phases in the development of the paper industry.

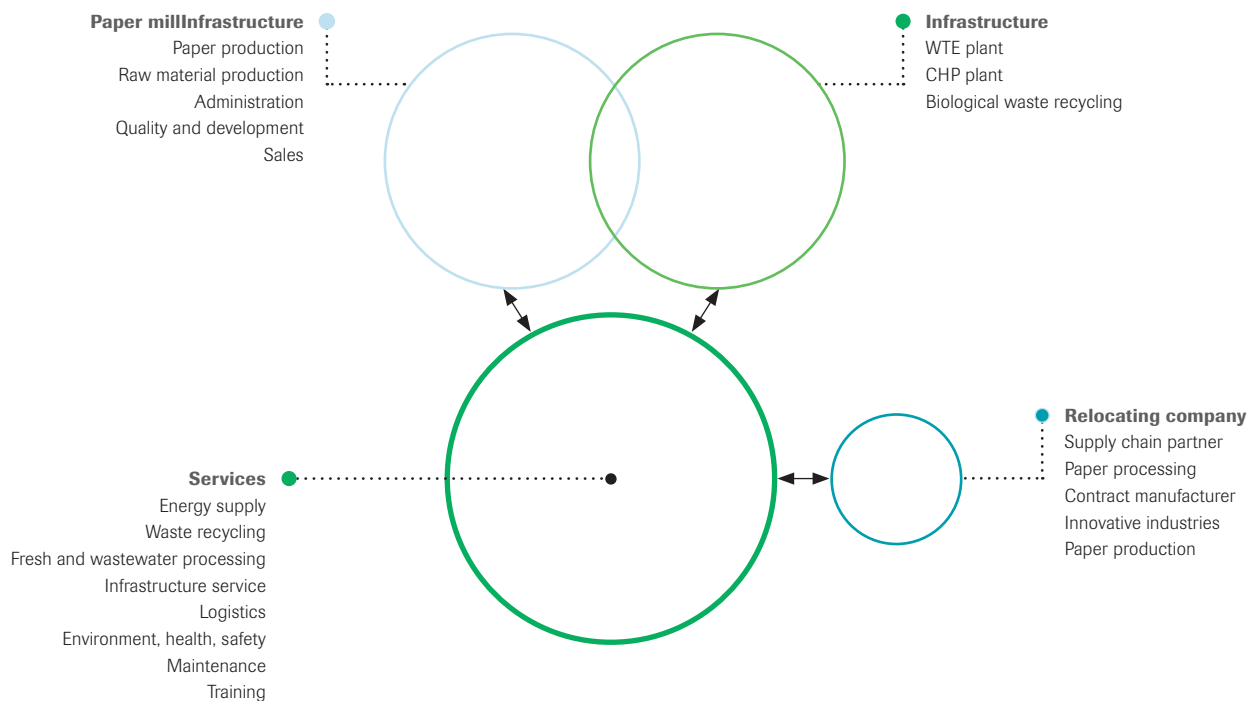
According to the roadmap, the industry will be characterized by new business models and strategic alliances with a wide range of unrelated sectors by 2050: Energy generation, chemicals, refineries, heavy industry, cement and many other industries will offer promising opportunities to create sustainable synergies.

# >> LAY THE GROUNDWORK **TODAY.**

**Active site or regional development is essential to making the most of these trends. Development efforts will only succeed if companies relocate or expand to a location that allows them to share necessary non-core infrastructure.**

The companies may be recruited from downstream industries in order to form whole or partial value chains. Other criteria focus on logistics: What transport routes does the region have? What resources can be mobilized easily? How many skilled workers can the region realistically provide? The following diagram shows a model park designed with these parameters in mind:

## MODEL PARK FOR 2050 ROADMAP



As you can see, InfraserV Höchst sees a site's potential with different eyes thanks to its experience and especially its outside perspective as a site service provider. We have the necessary knowledge and resources to sustainably manage and develop sites.

We look forward to having a constructive discussion with you!

# >> ABOUT INFRASERV HÖCHST.

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**Frankfurt-based Infracerv Höchst operates advanced technical infrastructure for companies in the chemical, pharmaceutical and related process industries. Infracerv Höchst leverages its experience and capabilities in site operation, management and consulting to deliver site excellence for its customers. The company, which operates Industriepark Höchst among other industrial estates, provides site services, utilities, waste management and logistics services.**

The Infracerv Group's wholly owned subsidiaries include Infracerv Logistics, Provalids Partner für Bildung und Beratung and Technion, a pilot plant service provider.

Infracerv GmbH & Co. Höchst KG has 1,900 employees and 149 trainees on its payroll. The Infracerv Höchst Group has 2,700 employees and 174 vocational trainees. In 2011, Infracerv Höchst and its subsidiaries generated approx. EUR 1.2 billion in revenues.

Industriepark Höchst is home to around 90 companies in pharmaceuticals, biotechnology, basic and specialty chemicals, crop protection, food additives and services. Some 22,000 people work at Industriepark Höchst. The site covers 460 hectares (1,137 acres); 50 hectares (123 acres) are still available for use. The companies at the park invested approx. EUR 383 million in the site in 2011. Total investments made since 2000 amount to around EUR 5.2 billion.

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