

RWE Power and BRAIN join forces in white biotech: co-operation on CO₂ as raw material for new products

- **Power generator and biotech company in joint project hosted by Coal Innovation Centre in Niederaussem**

Essen/Zwingenberg, January 04, 2010

To convert carbon dioxide into microbial biomass or biomolecules: such is the goal of co-operative research agreed between RWE Power and BRAIN AG from Zwingenberg. The power generator and the biotech company want to equip micro-organisms" with new enzymes and explore innovative synthesis-routes and pathways. Flue gas, rich in CO₂ from a lignite-fired power station, feeds these designer micro-organisms. The process creates biomass and industrial products such as new biomaterials, bioplastics and chemical by-products. Possible applications, now being explored, include building and isolation materials and the production of fine and specialty chemicals. An experimental plant is to be located at RWE Power's Coal Innovation Centre, at its Niederaussem power plant site.

BRAIN, a leader in white biotechnology, has access to hitherto unknown micro-organisms. Millions of innovative enzymes and synthesis routes and pathways are at its fingertips. With such a comprehensive 'natural toolbox,' the technologies of synthetic biology make it possible to design more effective micro-organisms. These, in turn, can provide a source of new product and material developments from CO₂. Working together, BRAIN and RWE Power are researching and producing these innovative designer micro-organisms. They should be able to integrate more CO₂ more efficiently using pathway engineering – and the use of new and enhanced synthesis-routes and pathways. These novel micro-organisms should prove more efficient than previously known species.

"Our search for biotechnological solutions to CO₂ conversion proves a point: we have the energy to lead in climate conservation," declares Dr. Johannes Lambertz, CEO at RWE Power. "Our goal is constant expansion of our range in this field. As well as reducing and storing carbon dioxide, we want to develop further intelligent uses. Quite deliberately, we are combining what we know about power generation with the expertise of specialist companies such as BRAIN. We want to find as many different solutions as possible," adds Lambertz.

"The targeted use of 'nature's toolbox' is making many industrial processes more effective, environmentally compatible and more sustainable. White biotech is a pointer to the industry of the future, which will conserve the environment and its resources," notes Dr Holger Zinke. As co-founder and executive chairman of BRAIN, he was a winner of the German Environmental Award from Deutsche Bundesstiftung Umwelt in 2008. "Working with RWE Power, we want to advance into a new aera of CO₂ conversion," explains BRAIN's Research Director, Dr Jürgen Eck. "There is a variety of microbial engineering pathways, while synthetic biology offers possibilities. Both lead to more efficient CO₂ conversion, using these powerful designer micro-organisms. So we are positive about the future success of our co-operation."

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Micro-organisms grow faster than plants and even algae. In fermentation units, high cell densities emerge from which more intensive mutation can be induced. Overall this leads to a higher level of carbon dioxide conversion. "Our co-operation boosts and expedites our research work in CO₂ use. It is an important step towards using biology to tackle technical challenges," underlines Dr. Johannes Ewers, New Technology/Carbon Capture & Storage Manager at RWE Power. Hot on the heels of algae conversion, the joint project with BRAIN is the company's second in this field.

RWE Power operates the Coal Innovation Centre at its Niederaussem power plant site. It has made this the centre of its activities for environmentally friendly power generation from coal. The company already operates Germany's first CO₂ scrubbing plant here. This is a prototype for pre-drying lignite (WTA fluid bed drying system). The plant utilises internal waste heat, and a REAplus high-performance scrubber, to improve the separation of dust and sulphur dioxide from the flue gas. Also, RWE's algae project integrates carbon dioxide with plant matter which can then be used as biomass, for example. All projects are working in conjunction with what is currently the world's most modern and efficient lignite-fired power plant (BoA1), and represent a total investment of EUR 90 million.

Press inquiries :	Lothar Lambertz	Dr. Martin Langer
	Press Relations RWE Power	Corporate Development B.R.A.I.N AG
	T +49 (0)201 122 3984	T +49 (0)6251 933 116

About BRAIN

BRAIN AG is an industrial "white" biotech company which discovers and develops novel bioactive natural compounds and proprietary enzymes for its partners and customers in the chemical and pharmaceutical industries, as well as the food and cosmetics industries. With its unique approach to the discovery and production of new biological compounds and biocatalysts, the company achieves creative solutions by harnessing nature's untapped biodiversity. Its success is built on its proprietary BioArchive comprising millions of genes, proteins and metabolic pathways from microbial isolates and metagenome libraries. Since its foundation in 1993, BRAIN has entered into over 50 strategic collaborations with nearly all the relevant companies within the chemical industry as e.g. BASF, Ciba, Clariant, Evonik Degussa, DSM, Genencor, Henkel, Nutrinova, Sandoz, Schering, Südzucker and Symrise, to name but a few. Currently, BRAIN employs 78 highly skilled people. Further information and photographs about the technology are available at www.brain-biotech.de

About RWE Power

RWE Power is Germany's biggest power generator, employing over 17 000 people in its open-cast mines, power stations, refining plants and research projects, training centres and offices. Output from the company's power plants contributes over 33 000 megawatts to RWE's broad mix of power from lignite, hard coal, nuclear, gas and renewables. RWE Power is investing billions in the construction of new power plants which conserve the environment, and in developing even more efficient and environmentally friendly techniques of generating electricity for the future. Further information and photographs of the Coal Innovation Centre are available at www.rwe.com