

Fact Sheet Technology	
Subject:	h-tec Activities Bergius-Pier
Rev:	April 2010
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Bergius-Pier Process (h-tec)

1. General

Notwithstanding that the developments made over the last almost hundred years in engineering, operating and optimization of the Bergius-Pier technology led to a superior process for Coal Liquefaction and Heavy Oil Upgrading, there are still opportunities to further increase the economics of this old technology.

h-tec experts achieved unique Know-how by developing various optimizations during their engagement at the Kohleoel-Anlage Bottrop, however some ideas could not be implemented due to the abandonment of activities in this technology by the former owners of the Bottrop plant in the late 1990's. Since then the realization of such potentials is part of h-tec's business.

Optimization potentials are given on the one hand by the developments made in material science, construction and manufacturing of equipments, valves, pumps etc. On the other hand optimizations in the process configuration itself show further optimization potentials for increased economics and to face today's GHG saving requirements. Last but not least the need for higher product qualities require careful adjustments of the overall process design to the customers' markets.

Some developments have already reached their commercial readiness and were implemented to commercial projects where they have proved their performance whilst others are in their development phase. Of course we can not disclose our activities – performed also with industrial and scientific/research partners – in detail, but the major outlines should give potential customers a first glance on where the old and for many forgotten Bergius-Pier technology is today – a competitive technology for Direct Coal Liquefaction and Heavy Oil Upgrading with strong history, proven its commercial readiness in independent assessments of almost 20 years operating the Kohleoel-Anlage Bottrop.

2. Technology Development Activities

2.1 General Process configuration

- ⇒ GHG emissions reduction
- ⇒ Residue Reduced Hydrogenation
- ⇒ Elimination of Residue Work Up unit
- ⇒ Supercritical Residue Treatment
- ⇒ Internal Hydrogen and Power production
- ⇒ Hydrogen from Biomass
- ⇒ Co-Processing of Biomass
- ⇒ Catalytic Gas Phase optimization / Quality improvements to marketable products
- ⇒ Increase of oil yields from DCL

2.2 Process Details

Process / Operation:

- ⇒ High temperature / high pressure processes
- ⇒ Reactive hydrogenation residues handling
- ⇒ Erosive, high solid containing slurry handling design and operating details
- ⇒ High viscosity media, also with non Newton behaviour processing
- ⇒ Draining, Flushing procedures
- ⇒ Coke formation protection
- ⇒ Operating and control philosophies conversion processes

Hardware:

- ⇒ Pump stations
- ⇒ Control valve arrangements
- ⇒ Low pressure heat exchanger
- ⇒ Furnaces
- ⇒ Vessel design
- ⇒ Valve and pipe design
- ⇒ Instrumentation and measurement devices (temperature, pressure, flow, level)