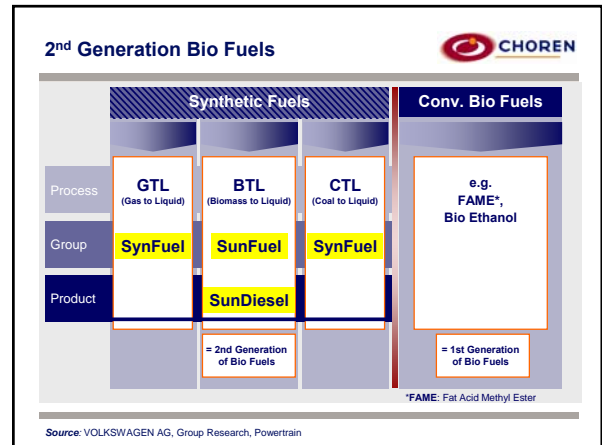
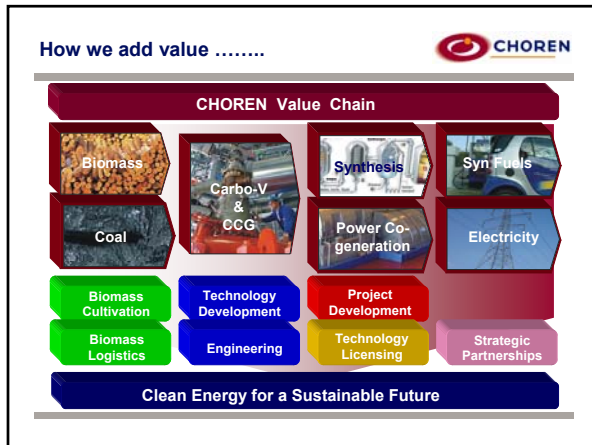

Biomass to Liquids

Strategies for Supply of Raw Material in the Energy Industry

Michael Deutmeyer
General Manager CHOREN Biomass GmbH

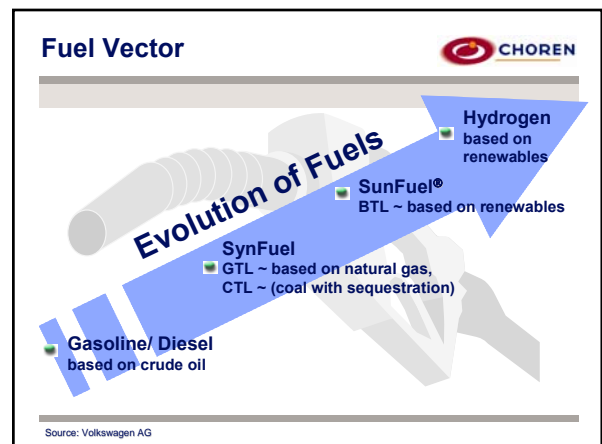
FAO, Geneva 11th of January 2007

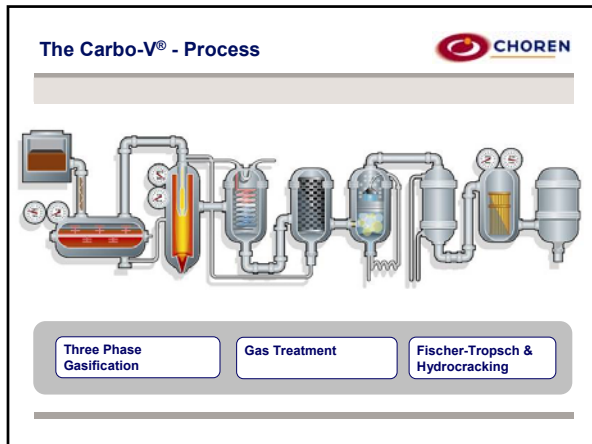
CHOREN's BTL Technology





Biofuels contribution to EU targets

Biofuel	CO ₂ Reduction	Energy Security	Agricultural Benefits	Target fuel / blend	Fuel Performance	Substitution Potential >10%
Plant Oil	⊖	⊖	⊖	Diesel	⊗	⊗
FAME	⊖	⊖	⊖	Diesel	⊗	⊗
Conv. Ethanol	⊗	⊖	⊖	Gasoline	⊗	⊗
Bioethanol (2 ^o)	⊕	⊕	⊕	Gasoline	⊗	⊕
BTL (2 ^o)	⊕	⊕	⊕	Diesel	⊕	⊕

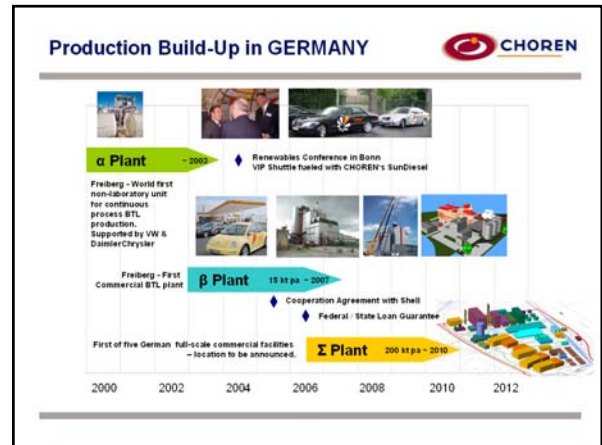





- ### BTL
- 
- A lot of advantages
- BTL is the cleanest possible combustion fuel
 - No aromatic content, therefore very low particle emissions
 - No sulfur, therefore no acidity / acid rain
 - Significant CO₂ emissions reduction
 - Fits any diesel engine, therefore no costly infrastructure changes (Premium Fuel blend / No additional Pumps)
 - High yield per hectare, therefore able to make a real difference
 - Creates jobs at home and provides opportunity for farmers
 - Energy security




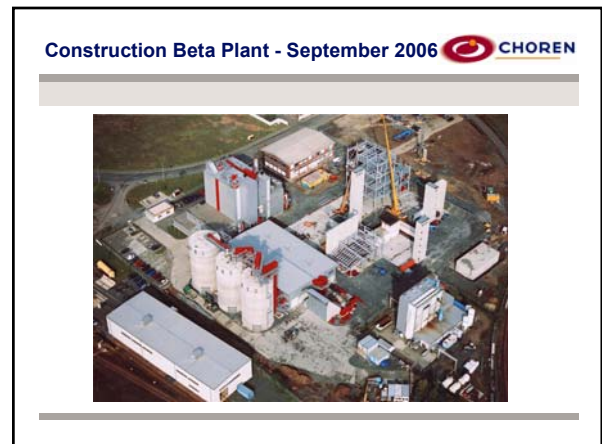
Business Development





Beta Plant – Completion: 2007



● 45 MW Thermal
 ● 75.000 t/a Biomass
 ● 16.5 mio. l SunFuel





CHOREN Locations - Germany





- ◇ Potential Production Facilities
- Office Locations
- ◆ Pilot and Scale-Up Facilities
- Shell Rheinland Refinery

Σ Plant Lubmin – Completion: 2008 / 2009




● 600 MW Thermal
 ● 1,000,000 t/a Biomass
 ● 4,500 BOPD SunFuel




Location Attributes

- Biomass availability
- Transport logistics
- Local Infrastructure
 - Synergy with local industry
 - Financial Support

Σ Plant Dormagen (BAYER Chemie Park)




● 600 MW Thermal
 ● 1,000,000 t/a Biomass
 ● 4,500 BOPD SunFuel

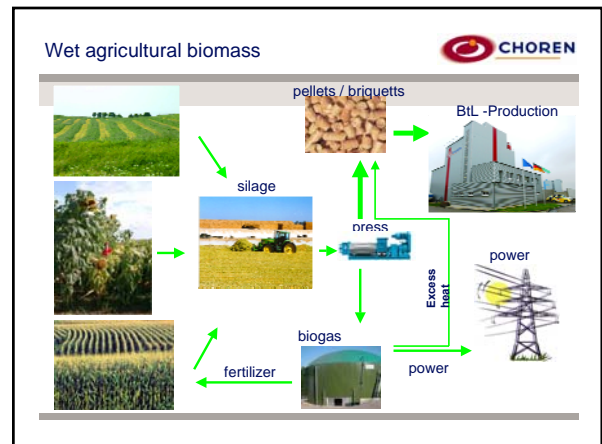
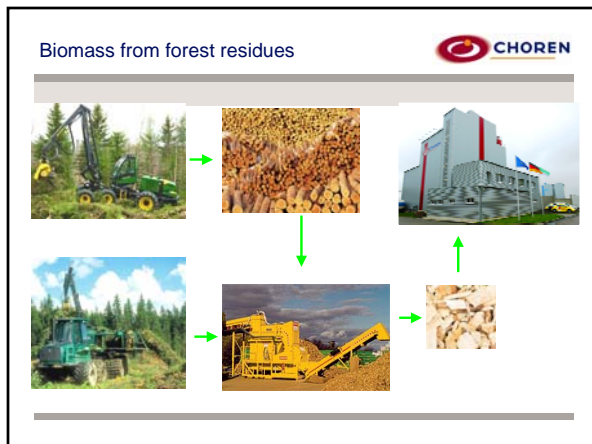


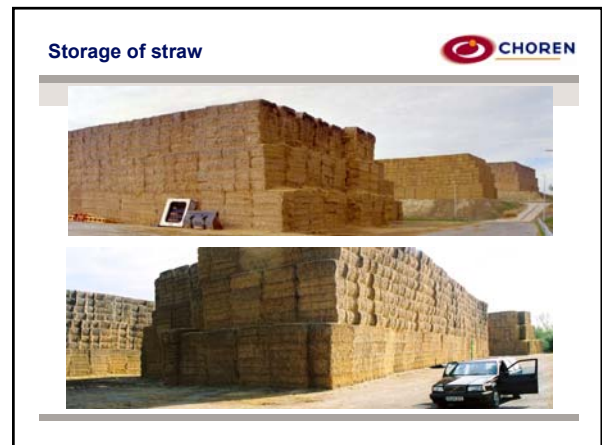
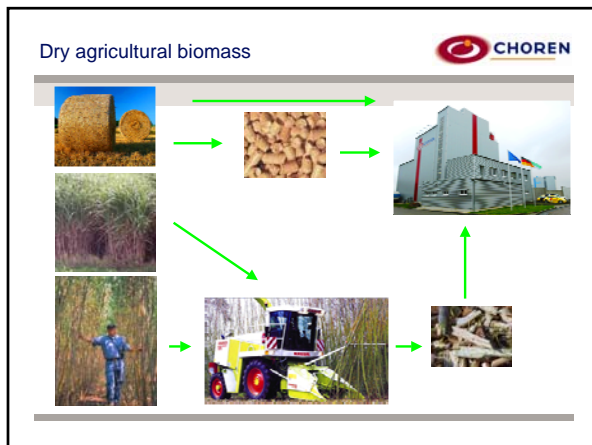
Location Attributes

- Infrastructure / Synergy
- Logistics
- Biomass



Biomass for BTL





Chance of Energycrops

demand and biomass potentials - EU

EU biomass production potential⁴²

Mtoe	Biomass consumption, 2003	Potential, 2010	Potential, 2020	Potential, 2030
Wood direct from forest (increment and residues)		43	39-45	39-72
Organic wastes, wood industry residues, agricultural and food processing residues, manure	67+3	100	100	102
Energy crops from agriculture	2	43-46	76-94	102-142
TOTAL	69	186-189	215-239	243-316

source: biomass action plan 7.12.2005

=> Biggest increase on agricultural land



2,5 ha Miscanthus plantation
start 12. & 13. Mai 2005



Plantation by 7th of October 2005



Plantation by 22nd of May 2006



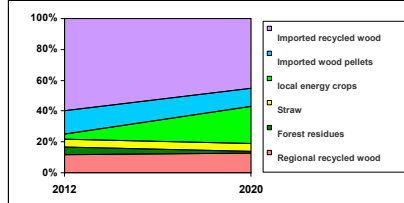
Wood plantations



Planned Feedstock portfolio



... for first sigma sized BTL production site in Germany



Feedstock demand: 1.000.000 t BDT (mostly woody biomass)

Logistics: allowing for cheap international imports

Energy crops: high local potential sought (especially on pasture)

Potential partners: large forest owners, pulp & paper, international plantation owners (buy products), recycled industry

Energy Biomass Outlook



- **steady increase in European imports**
(more stable and reliable political framework)
- **pellets main source of overseas Energy biomass**
(gains in transport costs overcompensate costs for pelletisation, question of capacity)
- **mainly industrial use**
(emission problem with domestic heating and cheaper alternatives)
- **further preconditioning at the place of growth**
(pyrolysis oil, torrefied wood pellets or charcoal pellets, finished fuel)
- **steep increase in dedicated production of woody energy biomass**
(short rotation in Europe, energy tree plantations in Africa, Latin America and other suitable low cost growing areas)

Biomass to Energy ...



... a question of coordinating supply and demand

- **Developing market tools in order to regulate indirectly supply and demand** (converting energy biomass to a commodity, e.g. pellets)
- **Giving clear long term targets and long term incentives to reach set goals** (e.g. German EEG)
- **Secure long term profitability for specialized new investments** (secure prices)
- **Secure minimum feedstock for existing biomass users** (reduce harmful effects and job loss for existing industries, e.g. pulp and paper, particle board manufacturer)
- **Doing this on a world wide level in respect to energy biomass production and preconditioning** (reducing pressure in the home market through fostering certified energy biomass imports and their production overseas)



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Thank you

FAO, Geneva

11th of January 2007