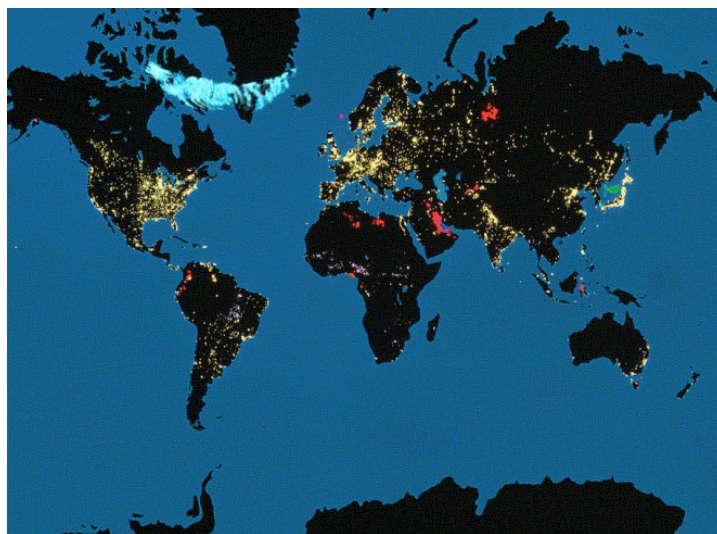
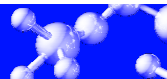


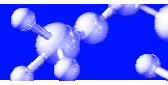
## Synthetic Biofuels for Mobility in China Status and Future

Klaus Noweck  
2.International BtL-Congress , 12.-13.October  
2006

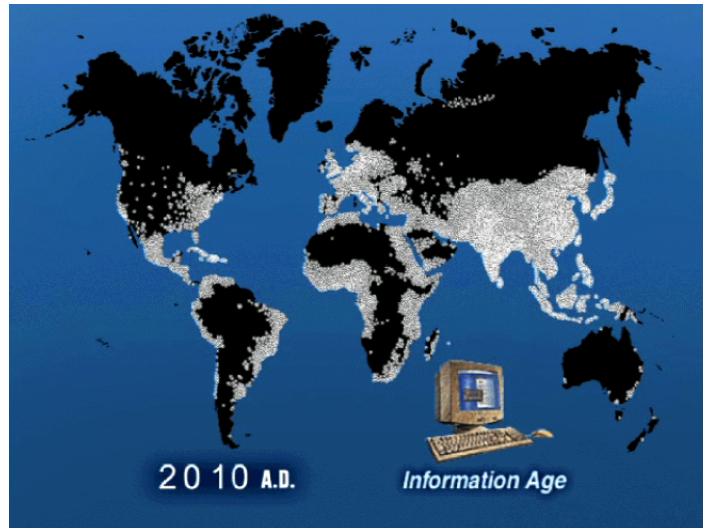
## The Blue Planet at Night Distribution of Energy Consumption



**Distribution of the World's Population  
2010 A.D.**

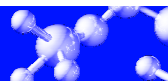


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3

**Fulfilling Mankind's Needs  
A Challenge for the Technology**



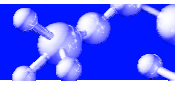
**Lurgi**

**How to fulfill mankind's needs in future?**

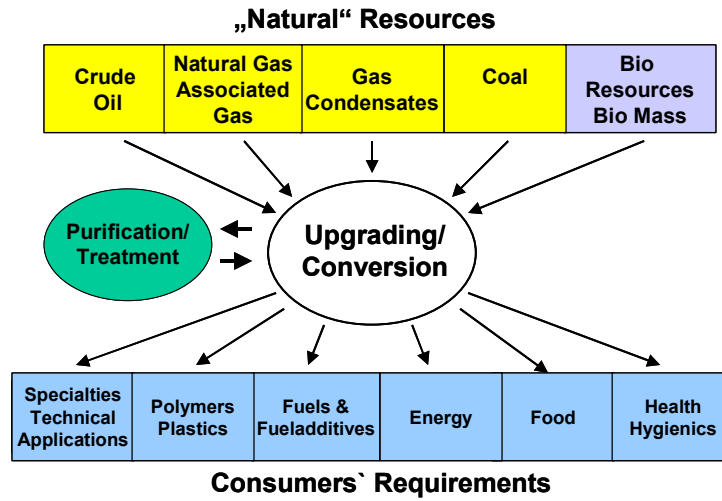
**How to overcome the imbalance between  
industrialized and developing countries?**

4

**From Natural Resources to Consumers' Products**

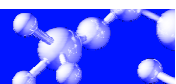


**Lurgi**

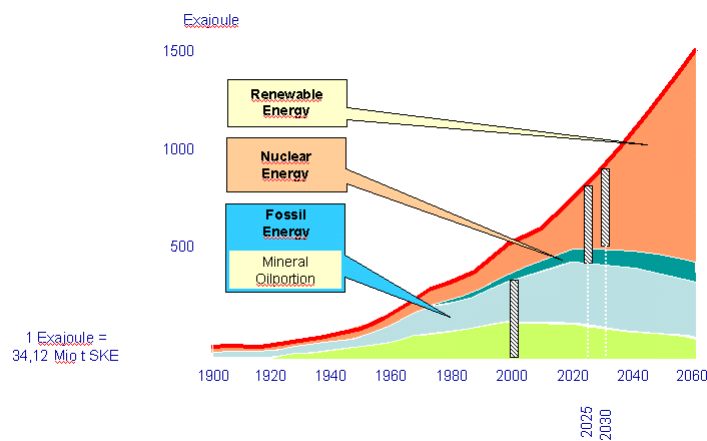


5

**Development of Energy Consumption**



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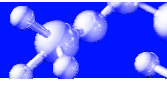


Renewable Resources must in 30 years provide approx. the same amount of Energy as from all fossil fuels today

6



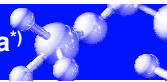
# Biofuels for China



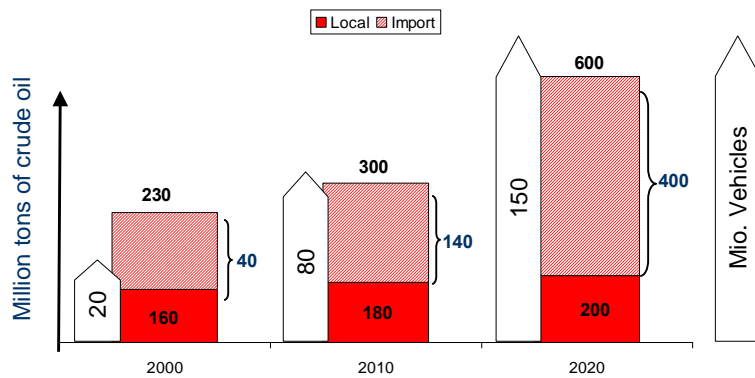
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# Increase in Vehicles and Oil Imports in China<sup>\*)</sup>

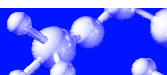


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Increase Vehicles 20 million — Factor 5 —> 150 million  
 Increase Costs —> \$ 100 billion  
 Oil imports (30 \$/barrel) \$ 20 billion — Factor 4 —> \$ 100 billion

<sup>\*)</sup> BP-Study 2003 Scenario „Business as usual“



### Oil/Gas/Coal-Production in China

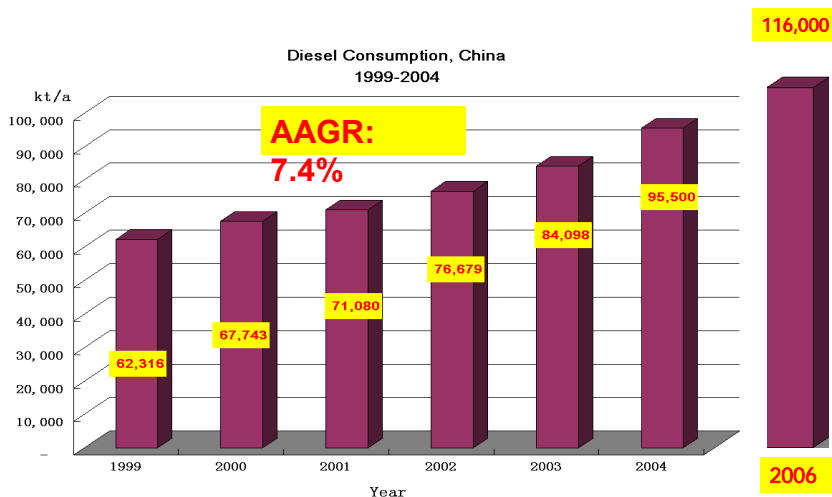
	1996	1997	1998	1999	2000	2001	2003
Crude Oil (million tons)	157,3	160,4	160,3	158,8	160,8	163,2	180,0
Natural Gas (TCF)	71,1	78,2	78,9	86,2	92,6	103,9	120,0

	1980	1985	1990	1995	1996	2000	2003
Coal (million tons)	620	872	1.079	1.292	1.374	1.000	1.566

China's energy future strongly depends on coal for electricity and fuels production

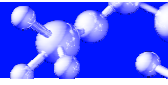


### Biodiesel Potential Market Volume



2% for biodiesel, expected market volume will be approx. 2,320,000 tons. Transportation sector (1/3 of total ) will be approx. 770,000 tons.

## Existing Supply



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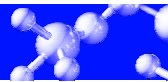
Fujian Longyan	20,000 tpa
Hainan Zhenghe	5,000 tpa
Sichuan Gushan	40,000 tpa
Handan Gushan	30,000 tpa

**Total 95,000 tpa**

The local producers are using spent cooking oil as feed stock and local technology for biodiesel production.

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## Chinese Local Biodiesel Price



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### Diesel retail price / CFPP 0 °C

Shanghai:	4.62 RMB / liter
Beijing:	4.76 RMB / liter
Shenzhen:	4.64 RMB / liter

### Crude vegetable Oil price

Rapeseed oil:	5,250-5,500 RMB / t
Soybean oil:	5,200 RMB / t
RBD palm oil:	4,600-4,750 RMB / t

### Biodiesel price

Low quality:	3.90 RMB / liter
High quality:	4.10 RMB / liter

### Economy Feasible Biodiesel price (by Mr.Leis)

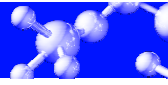
EBITDA 12%: 6.70 RMB / liter

Note:

- 1 Euro=10 RMB
- China without mineral oil tax up to now

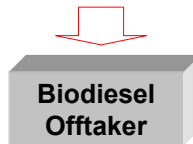
14

## Is Everybody Ready for Biodiesel?



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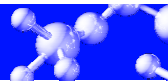
**Only three companies are allowed for  
gasoline / diesel sales.  
Sinopec / Petrochina / Sinochem**



**Large scale production has to be taken by  
Sinopec, Petrochina and Sinochem.  
But they are NOT willing to off-take any biodiesel from other  
producers.**

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## Jatropha Activities in India

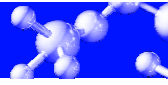


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**Biodiesel Plant for 100.000 tpy**



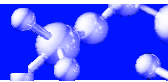
**Lurgi**



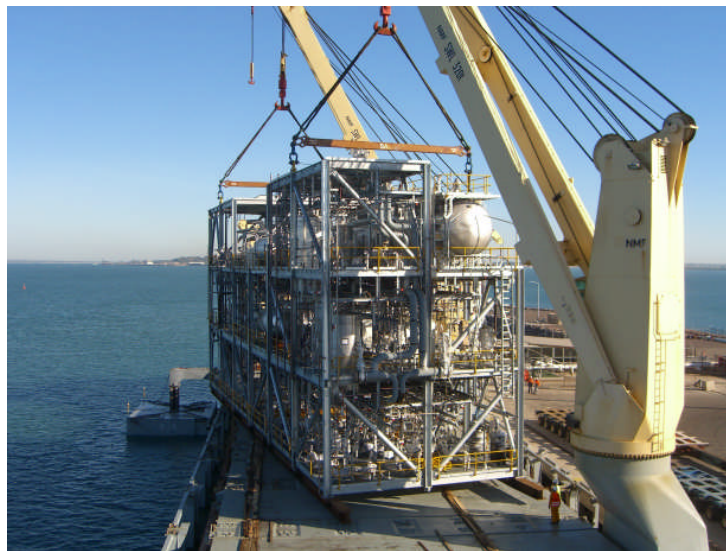
**Biodiesel Reference Plant**  
Natural Energy West (NEW), Marl

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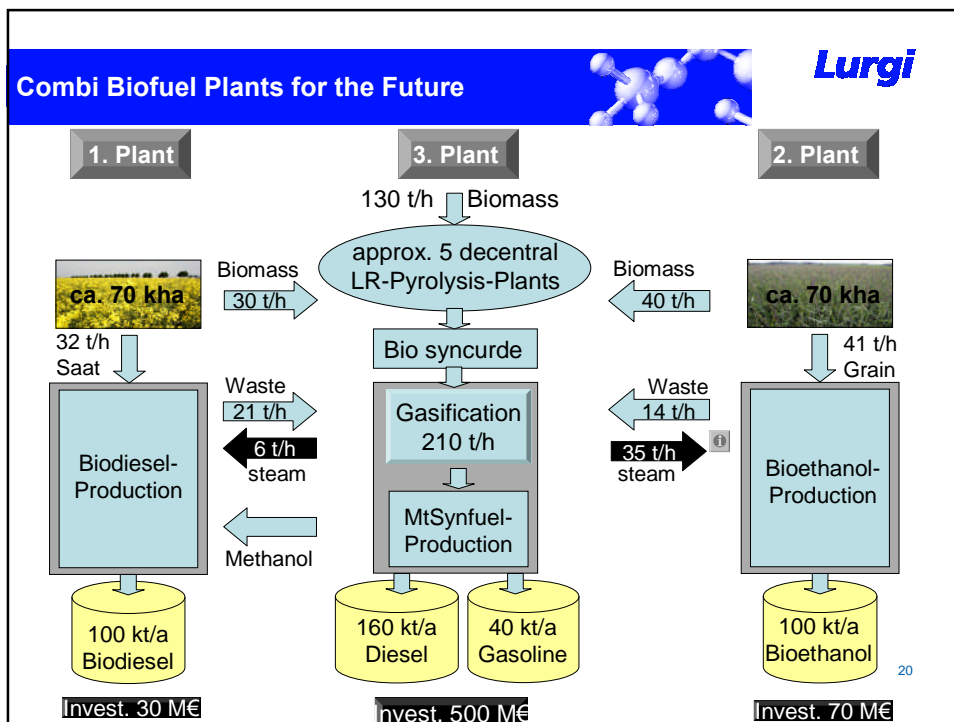
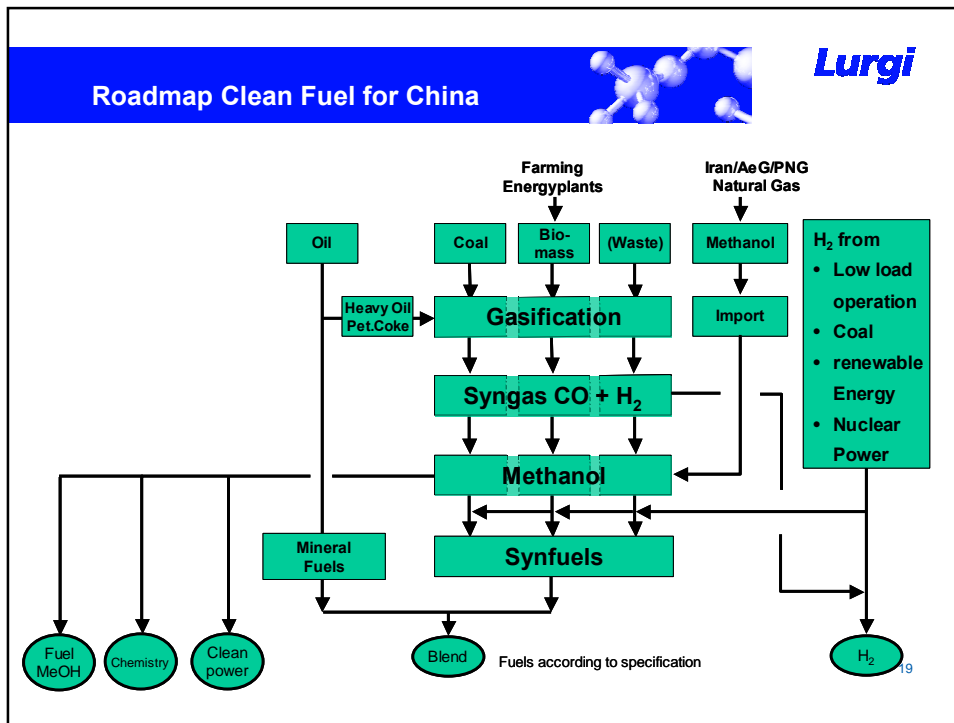
**Biodiesel Plant for Australia**



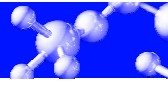
**Lurgi**



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## Wood Gasification as Fuel for Cars

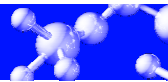


**Lurgi**

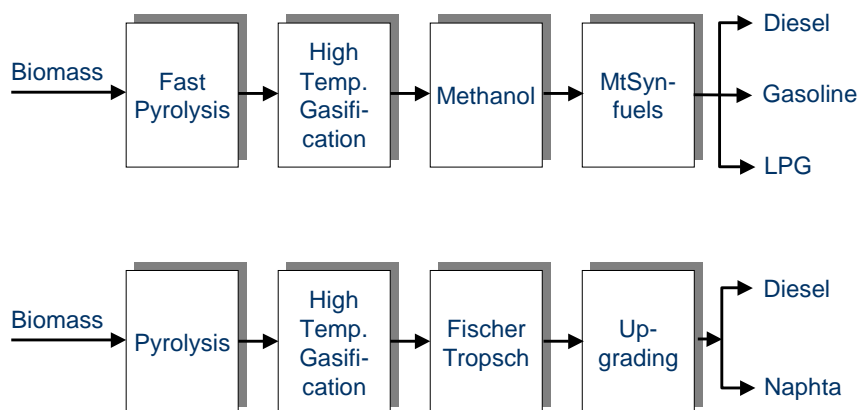


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## Synfuels from Biomass

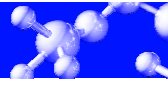


**Lurgi**

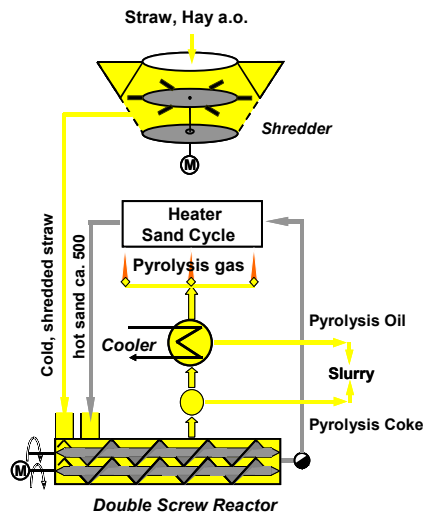


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## Pyrolysis Process of Lurgi / FZK



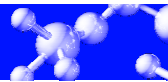
Lurgi



Source: FZK

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## Gasification HP POX - Freiberg



Lurgi

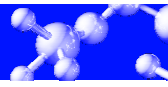


Demonstration plant for production of Syngas from Natural Gas, Liquid Hydrocarbons/Slurries at pressures up to 100 bar sponsored by BMWA, SMWK, mg technologies

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## Demonstration of FT Synthesis

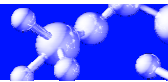


**Lurgi**

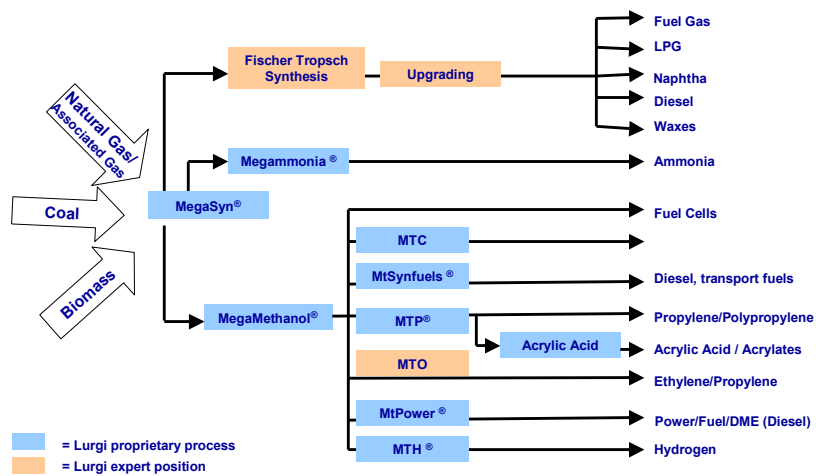


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## General Gas to Chemicals Processing Routes

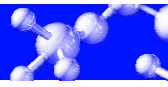


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## MTP in China

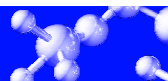


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## Summery I



**Lurgi**

The Development of Biofuels of the 1. Generation is Sustainable Worldwide and can be further developed by:

### Biodiesel:

- Broadening of the Raw Materials / Mixed Feedstocks
- Use of the Co-Products like Glycerin and Fatty Acids

### ▪ Bioethanol:

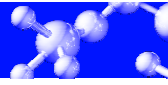
- Broadening of the Raw Materials
- Use of the Co-Products (Biomass)

### ▪ But:

As only the crops are used and not the whole plant, there is a  
→ Raw Material Limitation

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## Summery II



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**The Development of the 2<sup>nd</sup> Generation of Biofuels based on Biomass is the Winning Option in Future worldwide**

**Biomass can cover 30%+ of the primary energy demand, but should primarily be used as Carbon Source**

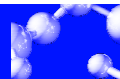
**Biomass is the Key Alternative for Oil**

**Biofuels based on Biomass Need :**

- **Basic research**
- **Regional Demonstration**
- **Industry Building embedded in Long Term Programs >10 years**
- **Sustainable Support by Legislation**

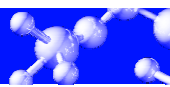
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**The Sun and Plants Deliver Renewable Energy and Raw Materials for Mankind's Future Needs**



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*Thank*

*You!*

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*Questions?*

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