

*SOPO - Praxair
Partnership in
Coal
Gasification*

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Praxair

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SOPO 索普

PRAXAIR



*SOP*O Overview 索普简介:

- **Large state-owned enterprise, founded in 1958.**

始建于1958年的中国国家大型企业.

- **Located in Yangzi delta area, fastest developing area in China .**

位于中国经济最发达的长江三角洲地区.

- **Subsidiary listed in Shanghai stock exchange.**

其控股子公司上海证交所上市

- **Assets 550 mil\$, employee 4200, professional technician over 1000.**

现有资产5.5亿美元, 员工4200人, 专业技术人员1000多.

- **Year 2005 Top 100 Petro-Chemical company and national Top 500**

industrial company. 2005年中国石化行业百强, 全国工业企业500强.

- **Current capacity: Glacial acetic acid 600k ton, Ethyl acetate 200k ton.**

目前生产能力: 60万吨冰醋酸, 20万吨醋酸乙酯.

- **2006 sales revenue: 500 mil\$, profit 60 mil\$.**

2006年实际销售5亿美元, 利润6000万美元.



Industrial Competitiveness 索普的行业竞争力

- **Leading position in industry**

中国国内醋酸行业龙头企业

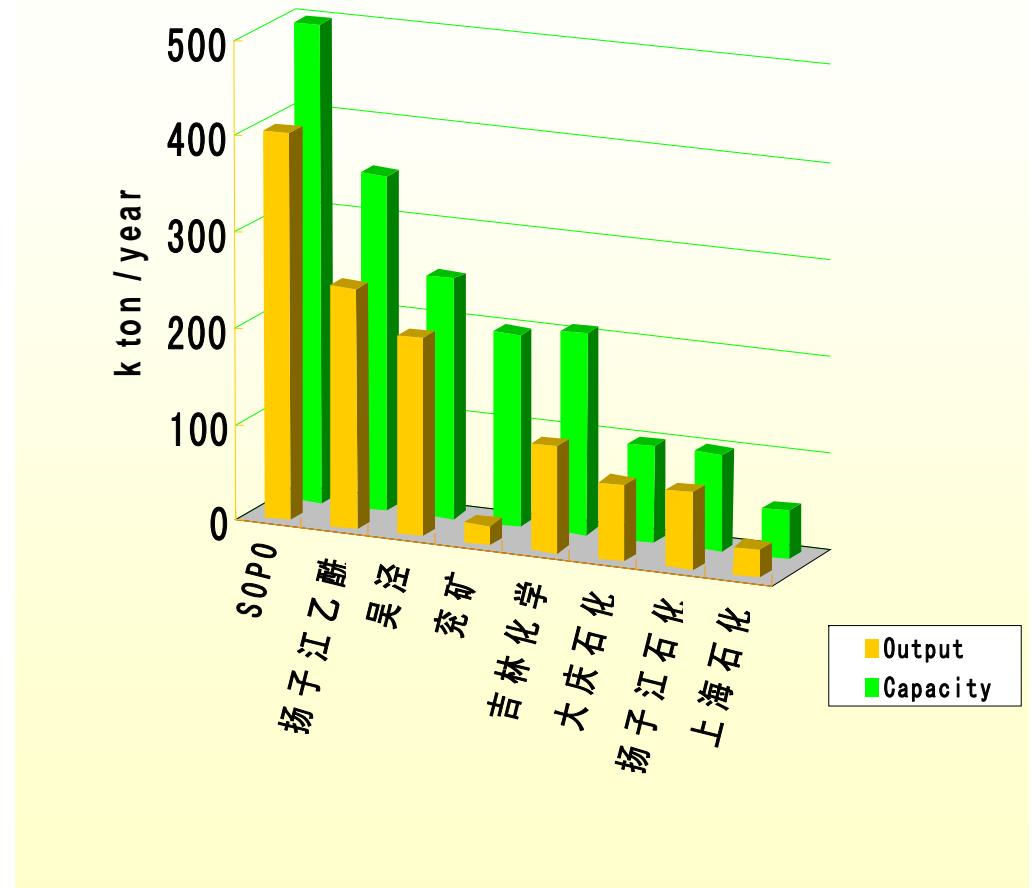
- **Single-plant output ranked the first in Asia, the third in the world.**

单厂生产总量, 亚洲第一, 世界第三.

- **Substantial achievements in developing highly efficient catalysts with ICAS.**

与中科院合作开发高效催化剂, 成果丰硕.

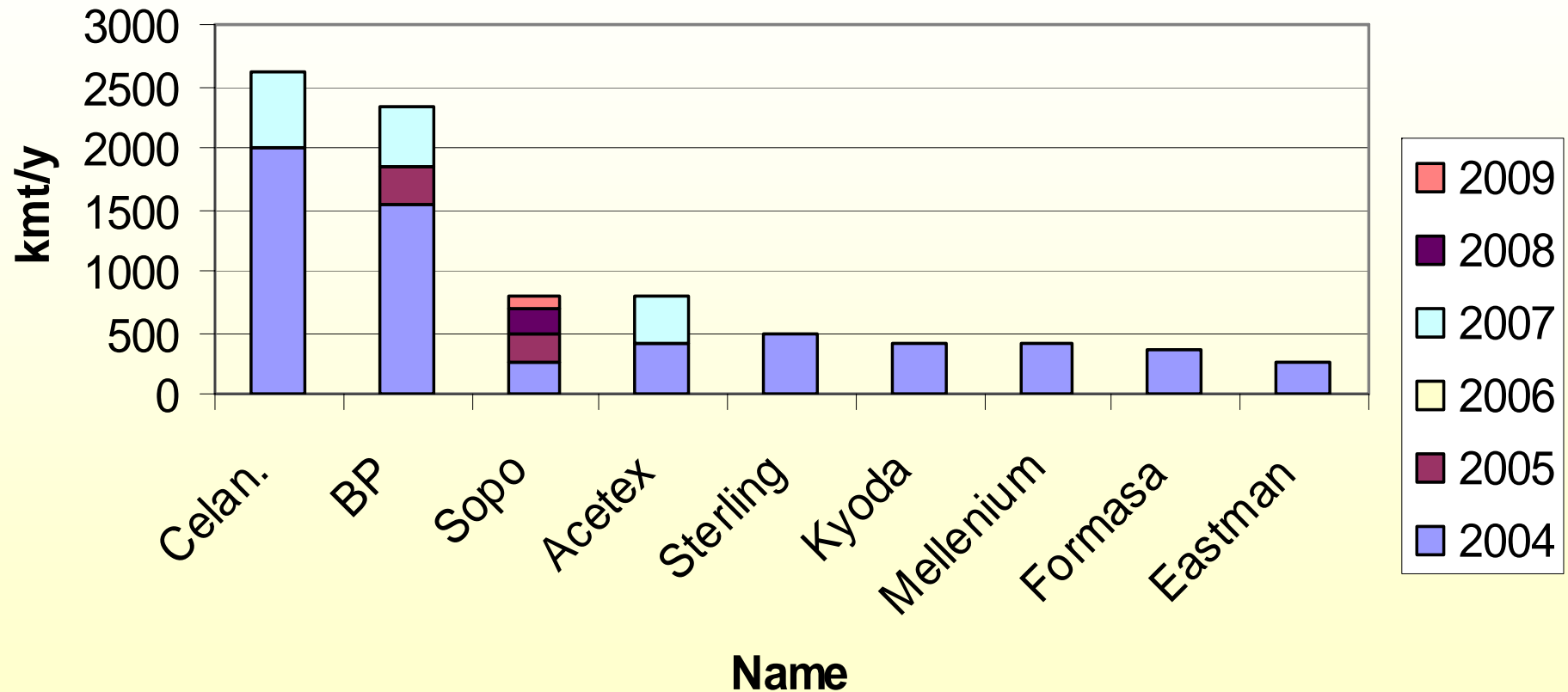
Output & Capacity of China Acetic acid main producers for year 2005



World Main Acetic Acid Producers

全球主要醋酸生产商

Worldwide Key Acetic Acid Producers



SOPo's strategic view and objective:

索普的战略发展理念和目标

- **Building a competitive acetic acid brand name, national and world wide.** 打造国际和国内最具竞争力的醋酸品牌.
- **Strengthen the cooperation with ICAS in developing highly efficient catalysts.** 加强与中科院开发高效催化剂的合作.
- **Improve output, decrease energy consumption, reduce costs.** 提高产量, 降低能耗, 降低成本.
- **Improve CO conversion rate, reduce CO₂ emission.** 提高CO转化率, 减少CO₂排放.
- **Strengthen and expand business based on low cost feedstock from coal gasification.** 利用煤制CO的优势将产业做大, 做强.
- **Integrate production chain from raw material down to processed products** 打通上游原料和下游深加工产品的产业链.
- **Attract investment, attract talent, and move toward the world.** 引资, 引智, 走向世界.

2006 Strategic planning: 2006年战略扩大规划

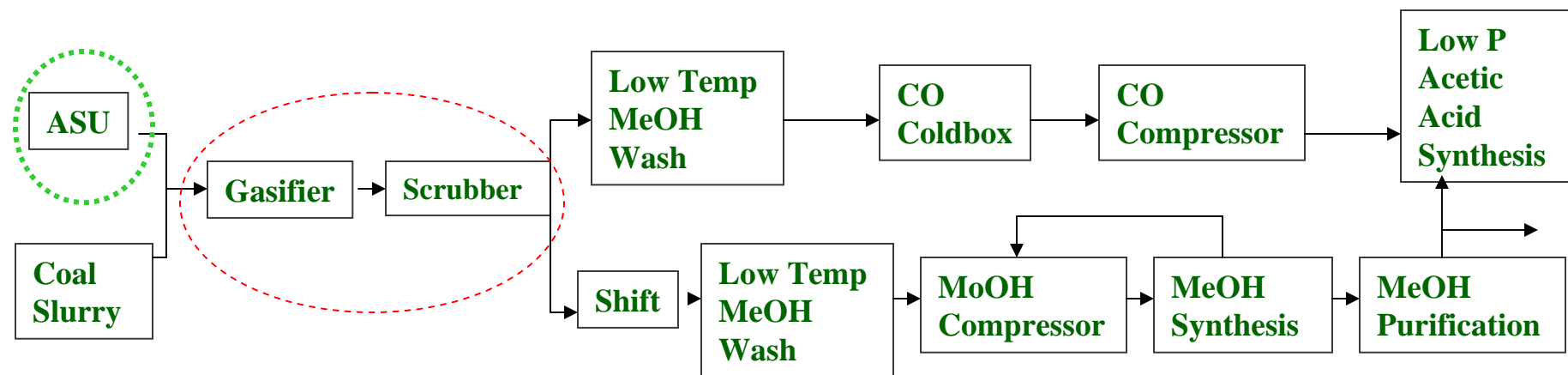
- **Using Acetic acid as core business, invest 2.5 billion RMB, build CO-Methanol production facility.**
以醋酸为核心, 投资25亿人民币, 建设甲醇联产CO装置.
- **Reduce CO costs 1.0-1.2 yuan / M3, reduce acetic acid costs by 460-550 yuan / ton, boost profit by 33 mil yuan.**
CO成本降低成本1.0 -1.2 元/M3, 醋酸吨成品成本下降460-550元, 带来3.3亿利润
- **Make profit from producing Methanol.**
生产甲醇亦有利可图.
- **Develop down stream products to balance Acetic acid production, enhance core competitiveness.**
向下游产品发展以平衡醋酸生产, 增强核心竞争力.
- **Integrate production chain from raw material down to processed products** 打通上游原料和下游深加工产品的产业链,
- **lower cost with Coal as raw material to compete globally.** 以煤为原料, 成本低, 增强国际竞争力.

Introduction for gasification project: **煤气化项目介绍**

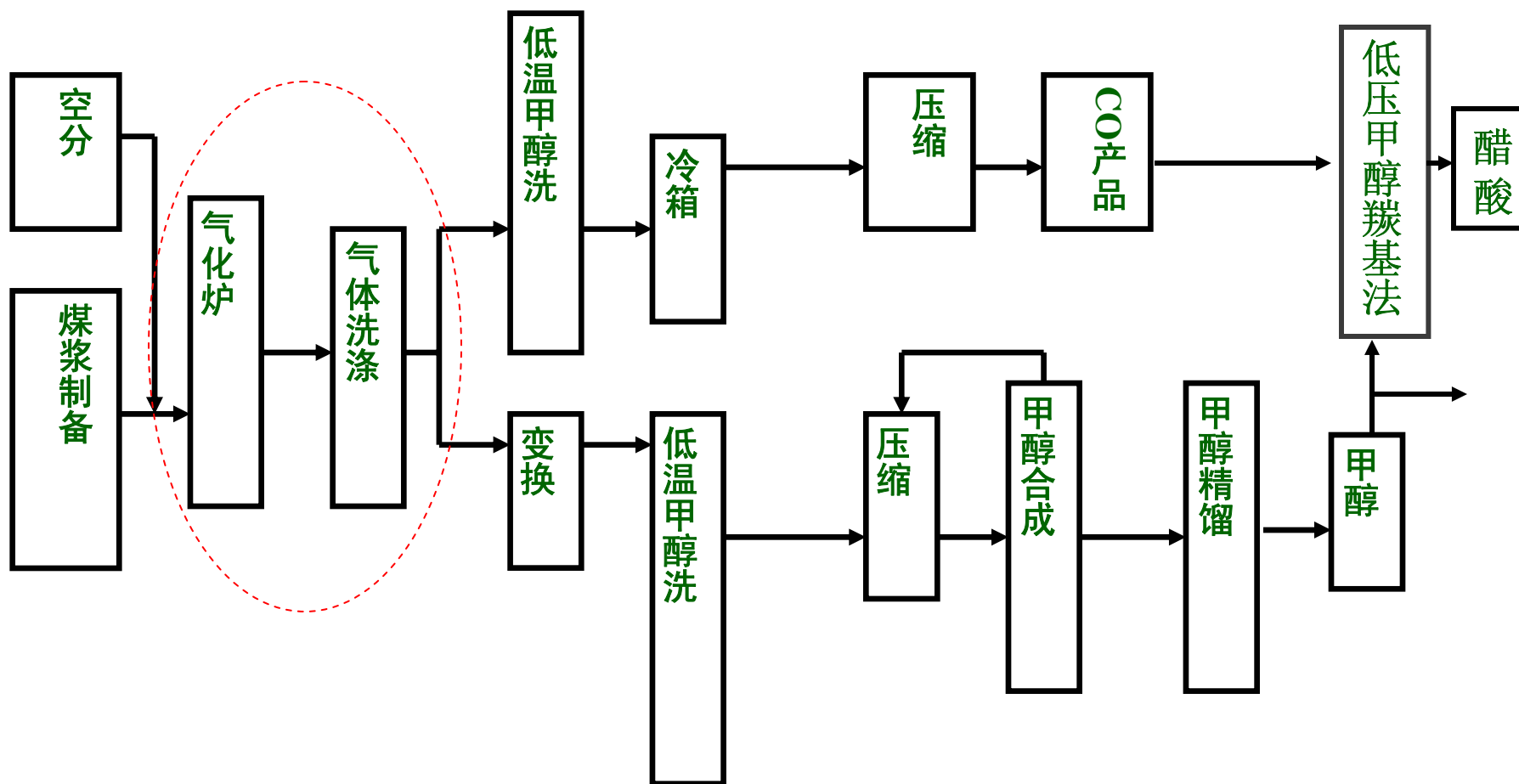
- **Invest 2.45 bil RMB, produce methanol 540 kton/year, CO 350 kton/year.**
投资24.5亿人民币, 年产54万吨甲醇, 35万吨CO.
- **Adopt coal slurry gasifier to produce methanol synthetic gas.**
采用水煤浆气化炉生产甲醇合成气.
- **Adopt dual tower methanol wash process.**
采用双塔低温甲醇洗.
- **Strategic partnership, ASU supplied by Praxair.**
战略合作, 空分由普莱克斯提供.
- **Adopt 3 patented technology.**
引进三项专利技术.



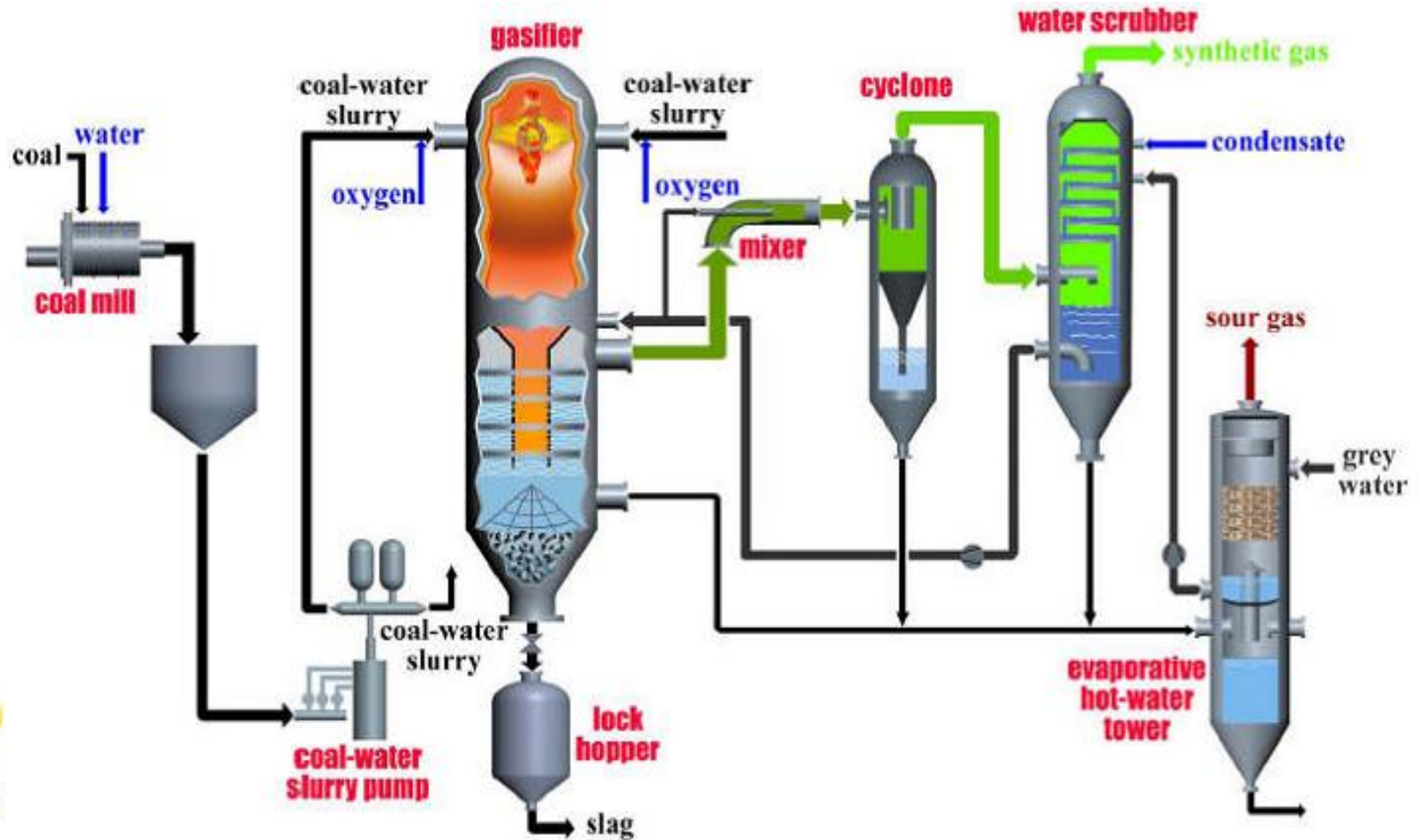
Integrated Process Flow Diagram: 工艺流程



Integrated Process Flow Diagram: 工艺流程



Opposed Multi-Burner Gasification Technology: 多喷嘴对置煤气化技术生产合成气



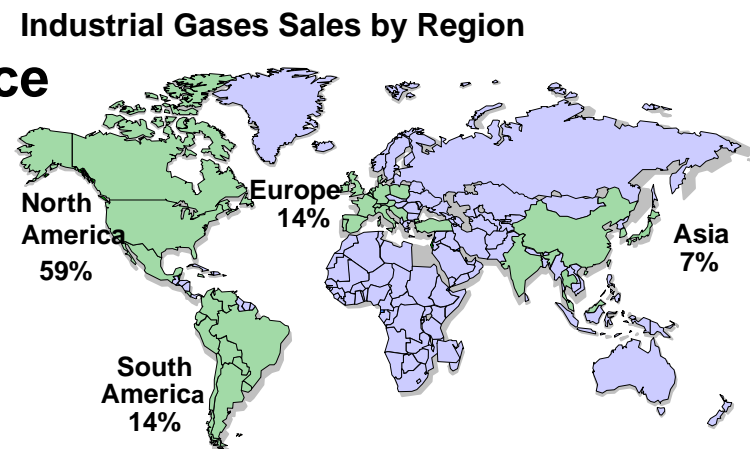
华东理工大学
兖矿集团有限公司

SOPO

PRAXAIR

Praxair Overview : 普莱克斯公司概况

- **2006 Sales: \$8.3 billion, a top three gases companies in the world**
位居全球工业气体公司前三强，2006年销售额83亿美元
- **Chemicals and Energy is a Strategic Segment (23% of total sales)**
化工和能源是公司的战略市场（占销售额的23%）
- **China is a Strategic Focus**
中国是普莱克斯公司的战略重点
- **100 years of air separation experience**
100年的空分经验
- **3,000 active patents**
三千多项有效专利
- **Voted one of the most admired chemical companies in the world**
被评选为全球最受尊敬的化学公司



Gasification Project & Operations Experience

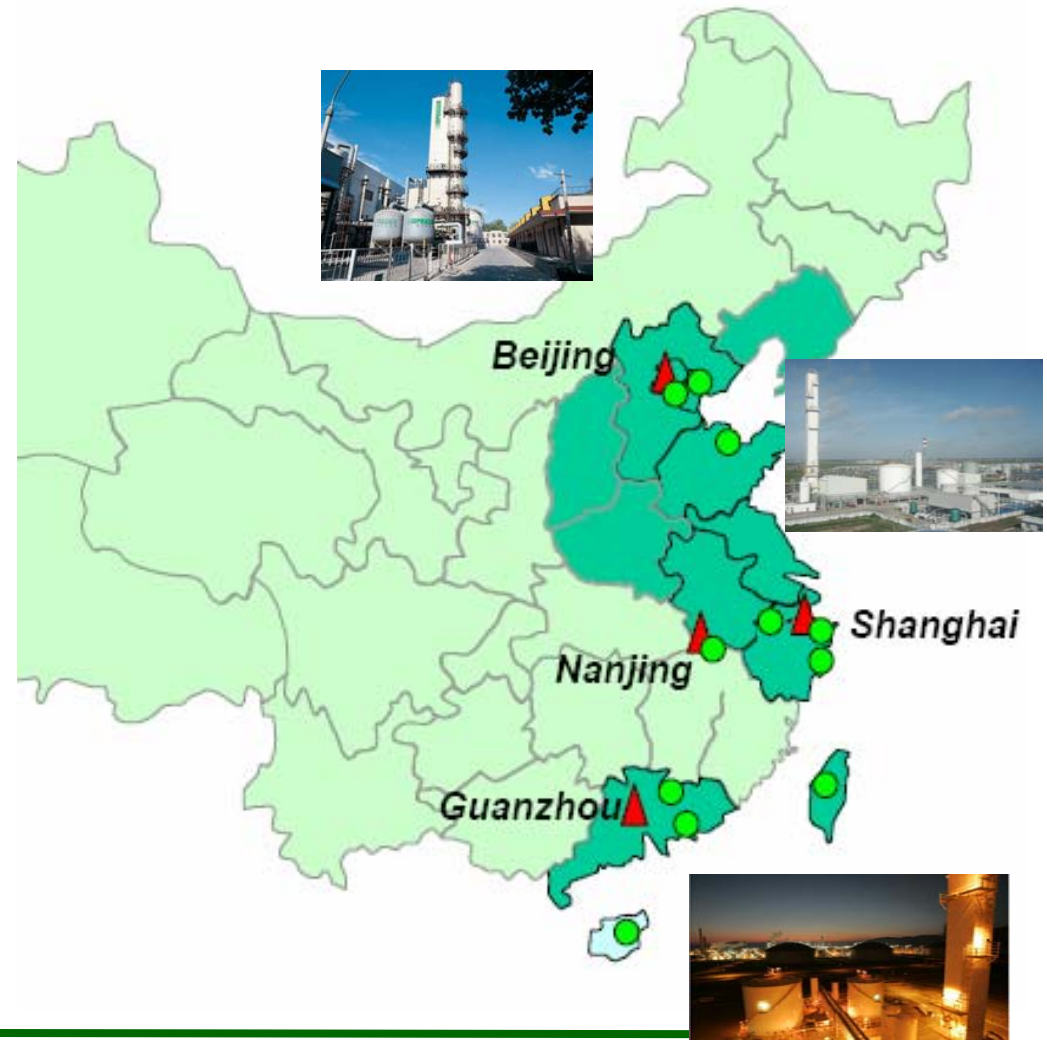
普莱克斯参与的气化项目和运营经验

- **Houston, Texas – Shell, Pipeline supply**
美国德州休斯顿 – 壳牌，管道供应
- **Wilmington, California - Texaco, 800 TPD**
美国加州惠明顿 – 德士古，每天800吨气体供应
- **Texas City, Texas -Dow, 600 TPD**
美国德州德克萨斯城 – 陶氏化学，每天600吨气体供应
- **Texas City, Texas - Praxair/Sterling, Pipeline supply**
美国德州德克萨斯城 – 普莱克斯/ Sterling化学公司，管道供应
- **API Refinery, Falconara, Italy, 2000 TPD**
意大利法尔可纳拉API炼厂，每天2000吨气体供应
- **Texaco, El Dorado, Kansas (Gas Turbine Integration)**
美国堪萨斯州旗鱼市德士古工厂（气体和透平集成）
- **Star Refinery - Delaware, USA, 2900 TPD**
美国特拉华州 Star炼厂，每天2900吨气体供应
- **SOPO, Zhenjiang, China 3300 TPD (in construction)**



Praxair In China 普莱克斯在中国

- \$550MM investment by 2006
- 24 entities
- 20+ locations
- Over 1000 employees
- China and Asia HQ's in Shanghai
- Pipeline Complex:
 - Beijing (1st in China)
 - Shanghai (SCIP)
 - BASF, BP, Sinopec, Bayer, Huntsman
 - Daya Bay (CSPC)
 - Cnooc-Shell



ASU Technologies 空分技术

■ Key technology

关键技术

- **Integrated supply systems**
集成供应系统
- **MPC Systems**
模型预估控制 (MPC) 系统
- **Turndown efficiency**
降负荷效率
- **Unattended operation for many of our facilities**
无人操作能力
- **Hi Flux Tubes for Oxygen boilers.**
热管式氧蒸发器
- **High Capacity Packing** 高能力填料

■ Key customer benefits

客户获得的主要利益

- **Lower power consumption**
减少能源消耗
- **Lower product costs**
降低产品成本
- **Lower site preparation**
减少场地要求
- **Enhanced Reliability**
提高可靠度
- **Increased Safety**
强化的安全性

Safety as a Priority 安全为先

- **Praxair's safety philosophy is reflected in its plant design**
Safety Standards 普莱克斯的安全理念体现在工厂设计安全标准中
 - **Critical Operating Parameter (COP)** 关键运行参数
 - **High Flux Main Condenser Design** 高循环量主冷的设计
 - **Double Filtration in LOX Pumping** 液氧泵双重过滤
 - **Conservative Oxygen Material Selection** 氧系统采用高于规范要求的材质
- **Safe operations design, including formal risk assessments and Hazop reviews** 包括风险评估和的安全操作设计
- **Safety training for operators and customers** 操作人员和客户的安全培训
- **Safety inspection before start-up** 开车前的安全检查
- **Automatic Operation** 自动运行

Main Condenser Design 主冷凝器的设计

- **Pool Boiling vs. Boiling to Dryness** 浸浴式蒸发与干蒸发
- **High Flux Module vs. BAHX** 高循环量模块与板式蒸发器
- **Dedicated Hydrocarbon Analysis** 专用的碳氢分析仪
- **Dedicated Carbon Dioxide Analysis** 专用的二氧化碳分析仪
- **Redundant Level Indication** 冗余的液位指示
- **Routine Acetylene Testing** 定期的乙炔测试



Regional Engineering Center in China

位于中国的地区工程中心

- **Praxair's Regional Project Execution Centers located in Shanghai**
位于上海，是普莱克斯亚太地区的项目实施中心
- **Complete Engineering and Procurement Capabilities**
具有完整的工程和采购能力
 - **Project Management** 项目管理
 - **Process Engineering** 工艺工程
 - **Electrical and Instrumentation Engineering** 电气和仪表工程
 - **Mechanical Engineering** 机械工程
 - **Procurement** 采购
 - **Plant Design and Drafting** 工厂设计和草图
 - **Cold Box Engineering** 冷箱工程
 - **Commissioning and Start-Up Team** 试车、开车团队

China Fabrication 在中国制造

- **First Cold Box Delivered in 2003** 2003年交付第一个冷箱
- **Completed 12 Cold Boxes and >50 Modules** 完成了12个冷箱



Yanda Factory, Shanghai
燕达工厂, 上海

Strategic partnership with Praxair: 与普莱克斯的战略合作

- **Alliance of Leaders, leverage respective advantages.** 强强联合发挥自身优势.
- **Praxair Advantages 普莱克斯优势:**
 - **Reliable technology, extensive operation experience** 技术可靠, 运行经验丰富
 - **Quick response, customer focus** 服务意识强, 对客户响应快
- **Invest capital on its core processes**
能将资金投资于自身的最强项.
- **Win-Win situation**
双赢成果



Current project execution status: **项目目前执行情况**

- **Orders placed for equipments with long lead time.**
完成长周期设备订货
- **Construction drawing for heat and power supply to be completed by this Oct.** 供热发电装置施工图今年十月完成
- **Construction drawing for gasifier and utility to be completed by this Nov.** 气化和公用工程装置施工十一月完成
- **Construction drawing for methanol facility to be completed January 2008.** 甲醇装置施工图明年元月完成
- **Cold box, CO compressor to be completed March 2008.**
冷箱, CO压缩机部分明年3月完成
- **April to June 2009 on stream expected.** 有望2009年4月至6月
开车试运行.

Closing: 结语

- **Coal Gasification Technology is reality in China with wide applications**
煤气化技术在中国是可行的, 将会有广泛的应用.
- **State of the art Integrated acetic acid production based on feedstock from coal gasification competes cost effectively globally**
基于煤气化获得生产原料并集成先进技术制造醋酸, 低成本优势全球领先.
- **Chinese Fabrication with world class technology and QA provides best of the both worlds**
具有世界级水平的技术及质量标准的中国制造将领先于世界.
- **Partnership of SOPO and Praxair will be long and prosperous on the world stage**
索普与普莱克斯的合作将是长久的, 繁荣的.



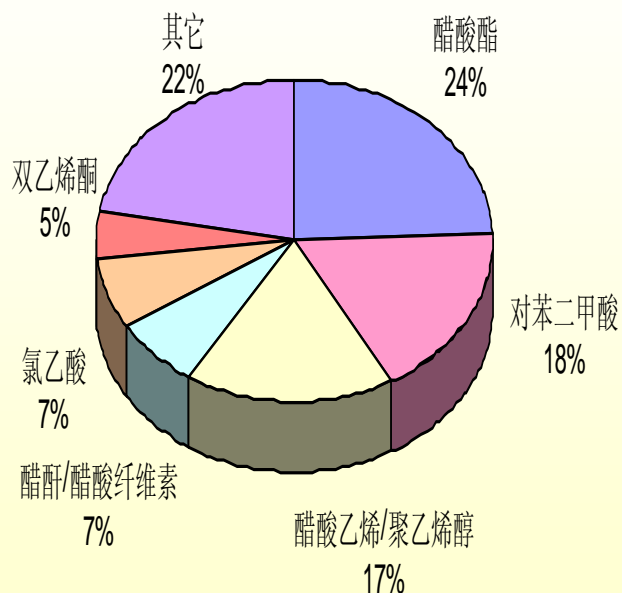
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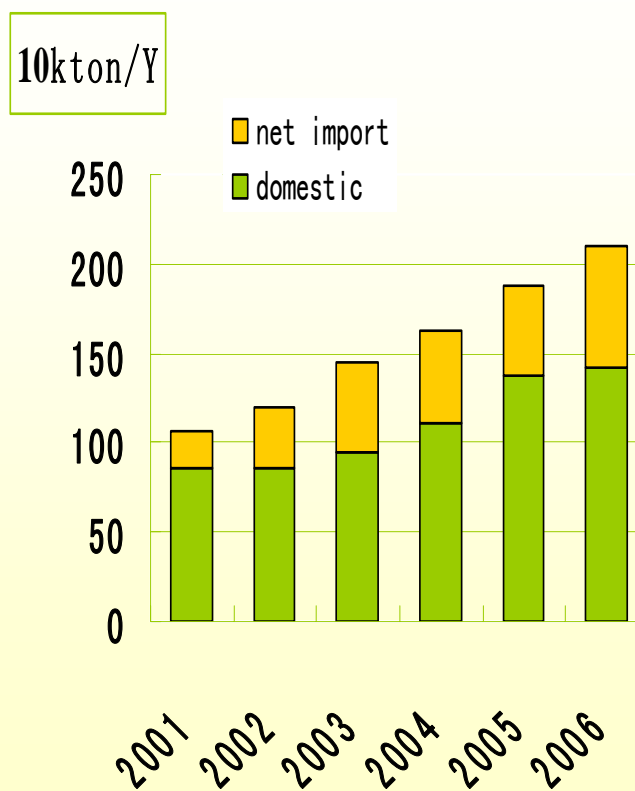
Backup Slides

Industrial Competitiveness 索普的行业竞争力

China acetic acid consumption for 2006



China acetic acid consumption



Industrial Competitiveness 索普的行业竞争力...续

Adopt domestic low pressure methanol carbonylation process, high conversion rate, low energy consumption, low costs.

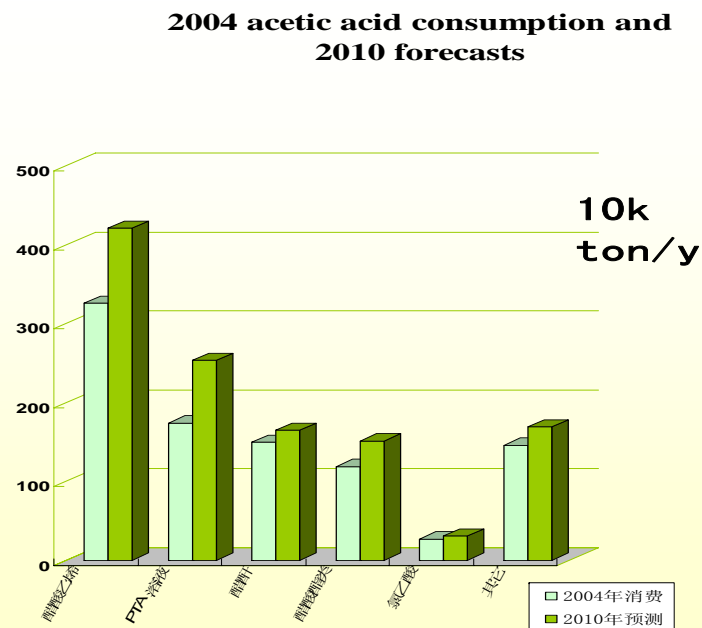
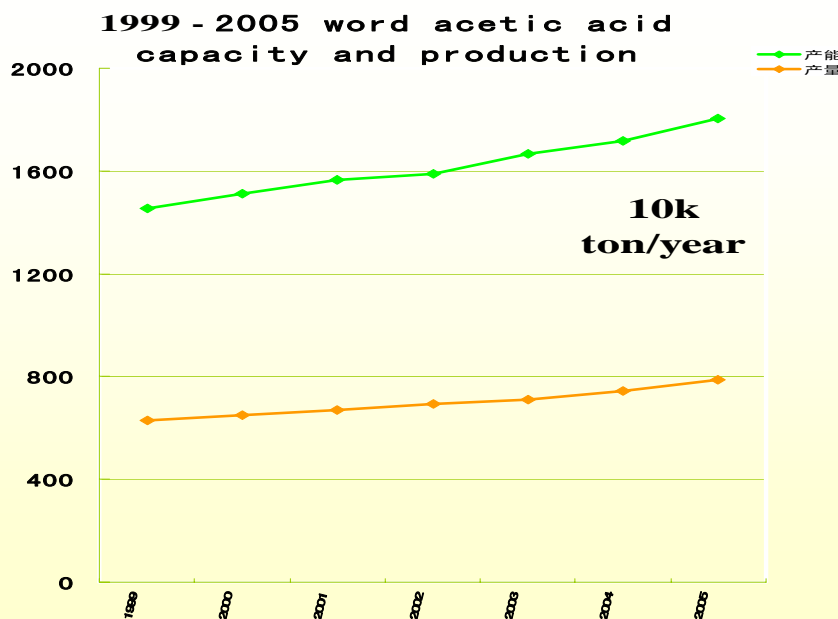
采用国有低压甲醇羰基法工艺, 转化率高, 能耗低, 成本低.

Comparison of 3 process:

	<u>alcohol</u>	<u>2 step ethylene</u>	<u>low pressure MC</u>
Raw material	methanol,O2	ethylene,O2	methanol,CO
Conversion rate	88%	95%	99%
Raw material consumption (kg /ton products)	920	528	541
Cooling water (m3/ton products)	180	20	150
Electric (kwh/t products)	700	85	30
Steam (kg/ton products)	5000	3000	2200
Overhead (yuan/ton products)	5626	5232	3154

Industrial Competitiveness 索普的行业竞争力...续

- **Build up production chain from raw material down** 打通上游原料, 下游深加工产品生产链, 核心竞争力增强.
- **World acetic acid production and consumption to increase steadily, SOPO annual sales 1.33 bil \$ expected by 2010.** 全球醋酸生产和消费平稳增长, 预计2010年, 公司销售13.3亿美元.



Gasification Project & Operations Experience: **普莱克斯参与的气化项目和运营经验**

- **Optimization and integration studies jointly with GE and Texaco.**
与通用电气和德士古公司合作研究系统优化和集成
- **Basic design studies with Parsons, GE, COP, and NYPA for the coal IGCC plant in NY, and selection by NYPA as ASU supplier.**
同Parsons、GE、COP 和NYPA合作研究在纽约建设基于煤气化的IGCC工厂的基础设计，并被NYPA选定为空分供应商。
- **Basic design studies with Nexant, GTI, and NREL for biomass gasification.** 同Nexant公司，GTI 和NREL（国家可再生能源实验室）一起研究基于生物质气化的基础设计。
- **Founding member of Gulf Coast Carbon Center, Futurgen Texas Advisory Council, Gasification Technologies Council Member, EFI Member.** 是美国海湾地区碳中心、Futurgen计划德克萨斯顾问理事会、国际煤气化技术委员会和EFI等组织和机构的发起成员。

Over-the-fence Gas Supply versus Captive ASU

客户买气与买设备的比较

Owning and operating Industrial Gas plants is the primary basis of the existence of IG companies like Praxair 拥有、运行空分工厂是普莱克斯一类的专业气体公司的首要业务

- **Plant operations is a core competency** 空分运行为其核心竞争力
 - **Global expert network** 全球专家网络
 - **Latest technology upgrades** 新技术更新
 - **State-of-the-art efficiency optimization software** 最新的优化运行效率系统
 - **Continuous improvement using Six Sigma and other cost reduction initiatives** 运用六西格玛及其它降成本方法所作的持续改进
- **Safety and reliability are assured** 确保安全和可靠度
 - **Access to liquid** 兼顾液体资源
 - **Global network of spare parts for better access and management** 拥有备品备件的全球后备系统以强化应急和管理
 - **Superior preventive maintenance experience and analysis** 优越的预防性维护经验和专长
- **Synergy of co-production, multiple customers, integration can create win-win solution for all customers** 联产、多用户和集成化的协同效应使用户获得双赢的解决方案
- **Competitive Bidding Process allows favorable pricing** 投标的竞争过程赢得了更好的报价

Over-the-fence Gas Supply versus Captive ASU (cont'd)

客户买气与买设备的比较 (续)

Allows customers to focus on core processes

使客户更专注于自身的核心业务

- **Customers can focus on aspects of their business they know best**
客户可更专著于其所精通的业务内容
- **Customers can concentrate their resources to achieve higher value growth for their owners** 客户可将资源更集中在为其股东创造更高价值的增长上
 - **Financial** 财务方面
 - **Physical Assets** 资产方面
 - **Intellectual** 知识产权方面
- **Reduced Investment Requirements** 减少投资负担
 - **Removes burden on corporate balance sheet** 免除公司资产负债表上的麻烦
 - **Shared project risk** 共担项目风险

Over-the-fence Gas Supply versus Captive ASU (cont'd)

客户买气与买设备的比较 (续)

Challenges: 挑战

- Risk Management can be a challenge for both parties
 - 双方都面临着风险管理的挑战
 - Project Risk 项目风险
 - Credit Risk 资信风险
 - Reliability Risk 可靠性风险
- Concept of Long Term Take or Pay Contract not widely understood
 - “照付不议”的长期合同概念尚未被广泛接受
- Legal Environments still evolving in China 法律环境尚待完善
- Cost of Capital not well understood by some customers, thus build versus buy analysis often biased 资本成本的概念尚未深入人心，许多客户对买气与买设备之分抱有成见

Trends and Opportunities: 趋势和机会

- The best practice of Over-the-fence Gas Supply in International business world has been recognized by some of China players
 - 国际上盛行的买气（隔墙供应）的经验已经开始为中国的客户所接受