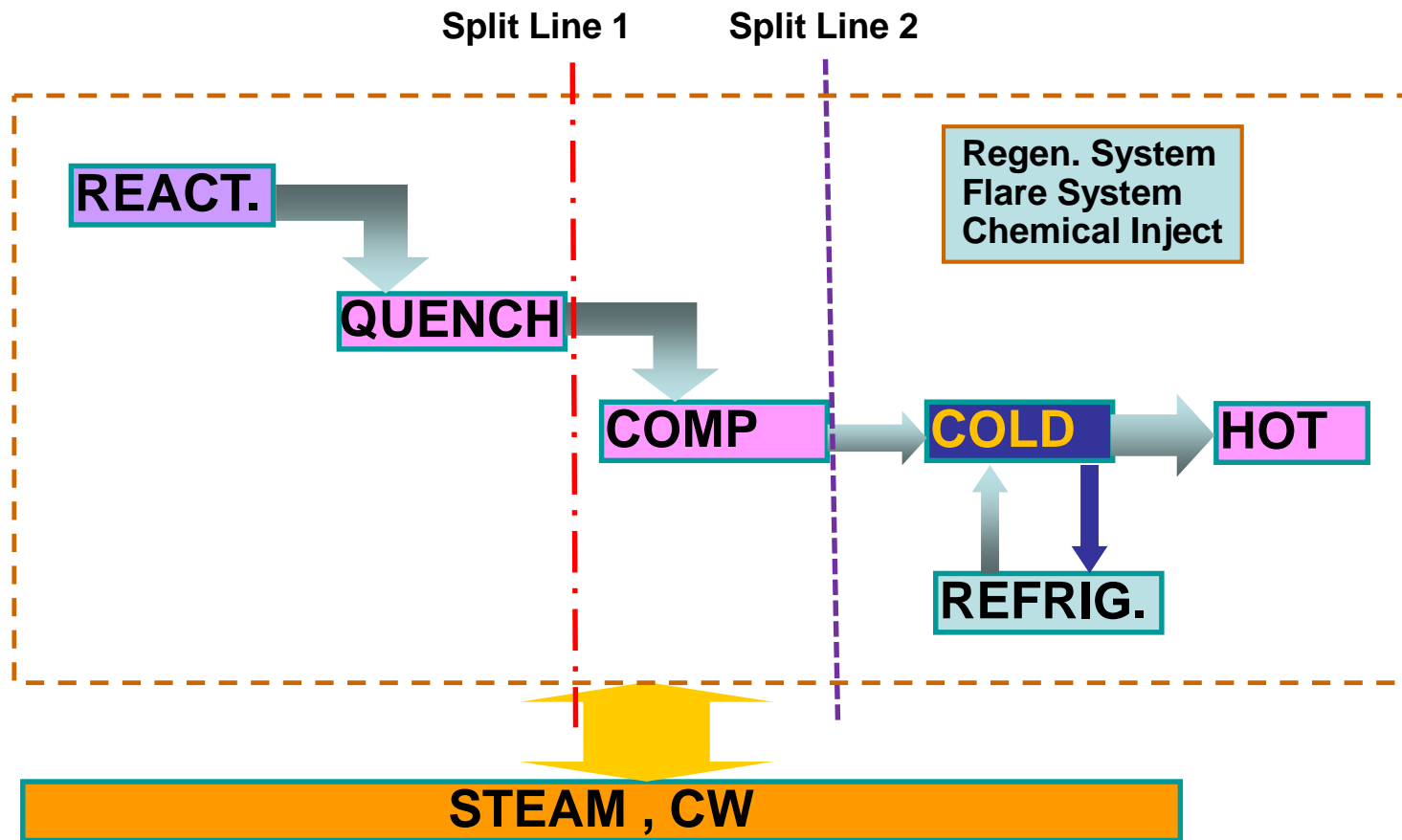


MTO Olefin Recovery Process

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MTO PLANT TWO SECTIONS



组成特点

Composition features

- ◆ 甲烷氢含量低
Low H₂+CH₄ content
- ◆ 乙烯丙烯含量高
High C₂H₄+C₃H₆ content
- ◆ 含有机氧化物
Various organic oxygenates
 - 醇 Alcohol(RCOH)
 - 酮 Ketone(RCOR')
 - 醛 Aldehydes(RCHO)
 - 酸 Acid(RCOOH)

项目Item	Spec
乙烯 C ₂ H ₄	99.95 mol % min.
甲烷+乙烷 CH ₄ +C ₂ H ₆	500 mol ppm max.
乙炔 C ₂ H ₂	5 mol ppm max
氢 H ₂	5 mol ppm max
甲醇 MeOH	5 mol ppm max
氯 Cl	1.0 mol ppm max.
碳三及以上馏分 C ₃ +	10 mol ppm max
一氧化碳 CO	0.5 mol ppm max.
二氧化碳 CO ₂	5.0 mol ppm max.
氧 O ₂	1.0 mol ppm max
总硫 S	1.0 mol ppm max
水 H ₂ O	1.0 mol ppm max
氮化物 N	0.2 mol ppm max.
COS	0.02 mol ppm, max.
MEK	1 mol ppm, max.

项目Item	Spec
丙烯 C ₃ H ₆	99.6 mol % min.
丙烷 C ₃ H ₈	0.4 mol % max.
甲烷 CH ₄	100 mol ppm max.
乙烷 C ₂ H ₆	200 mol ppm max.
乙烯 C ₂ H ₄	10 mol ppm max.
乙炔 C ₂ H ₂	1.0 mol ppm max.
甲基乙炔+丙二烯 MAPD	5 mol ppm max
丁二烯 BD	1.0 mol % max
丁烯 Butene	1.0 mol ppm max
C ₄ +	10 mol ppm max
氢 H ₂	5 mol ppm max
一氧化碳 CO	0.05 mol ppm max
二氧化碳 CO ₂	5 mol ppm max
氧 O ₂	4 mol ppm max
水 H ₂ O	2 mol ppm max
总醇 alcohol	4 mol ppm max
总氯 Cl	1 mol ppm max
总硫 S	1 wt ppm max
MEK	1 mol ppm max
COS	0.02 mol ppm max

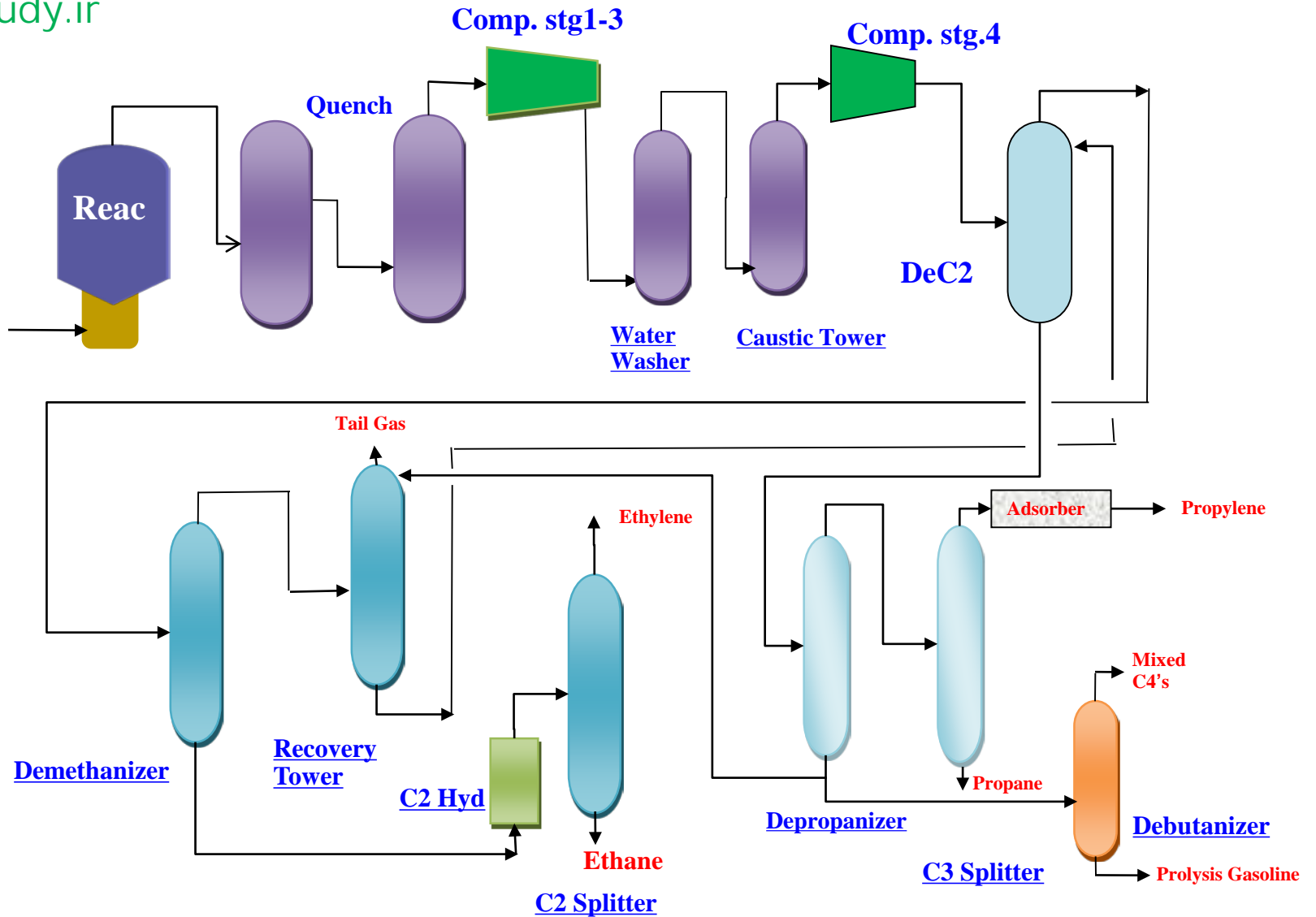
How to Produce Qualified Product?

- **Hydrocarbon—Rectification/Hydrogenation**
- **CO₂ Removal —Caustic Scrubbing**
- **Oxygenates Removal**
 - water soluble —water washing**
 - water Partly soluble —water washing/adsorbing**
- **Recovery Enhancing — Solvent absorbing**

- **前脱乙烷流程**
Front-End Deethanizer
- **碳四吸收提高乙烯回收率**
C4+ absorbing to Enhancing Recovery
- **后碳二加氢（单段床）**
Single Bed C2 Hydrogenation
- **丙烯制冷提供冷量**
Propylene Refrig. To provide cold.
- **与反再系统综合考虑热量利用及蒸汽系统**
Optimizing Heat & Steam System
- **烯烃收率：99.9%。**
Olefin Recovery: 99.9%

S-MTO Olefin Recovery

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序号 No	类别 Category	设备台数 Pieces
1	塔 Tower	11
2	容器 Drum	35
3	换热器 HX	52
4	泵 Pump	37
5	压缩机组 Compressor	2
6	反应器, 干燥器, 吸附器 Reactor, Dryer, Adsorber	12
	小计 Sum	150



技术优势 Technology Advantage

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- 前脱乙烷流程简单、能耗低、可靠性好
Process Study shows: Front End Deethynizer process is simple, low energy consumption, high reliability

	顺序流程 Sequence	脱乙烷流程 Front-End DeC2	前脱丙烷流程 Front-End DeC3
能耗 Energy	+4.97%	基础 Base	+4.65%



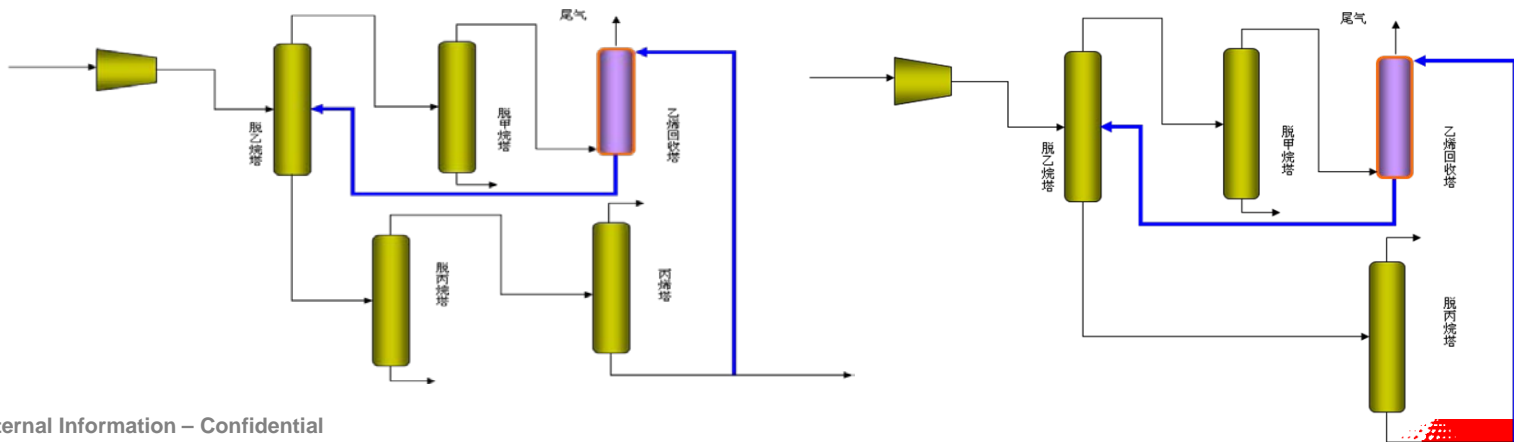
技术优势 Technology Advantage

- 乙烯回收率高，吸收剂损失小、设备小
High Ethylene Recovery with low solvent loss and small equip. size
 1. 利用自产C4+组分作吸收剂，不需要外引吸收剂；**C4+ Stream from DeC3 BTMS as Solvent, No need to import from offsite**
 2. 吸收效率高，循环量小，吸收剂损失小；**Low Solvent Circulation and loss Because of High absorbing efficiency**
 3. 返回脱乙烷塔的富吸收剂有助于碳二/碳三分离
Rich Solvent returning to DeC2 Tower improving C2/C3 separation and making reflux ratio drop

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• C2 Recovery Comparison

	其它专利商 丙烷吸收方案 Others: Propane as absorbent	SEI 碳四吸收方案 SEI: C4+ as absorbent
吸收剂损失absorbent loss	638%	基础BASE
能耗 Energy	+4.4%	基础BASE
丙烯塔 C3 Splitter	直径ID:8.4m 塔板Tray No:241	直径ID:7.5m 塔板Tray No:236



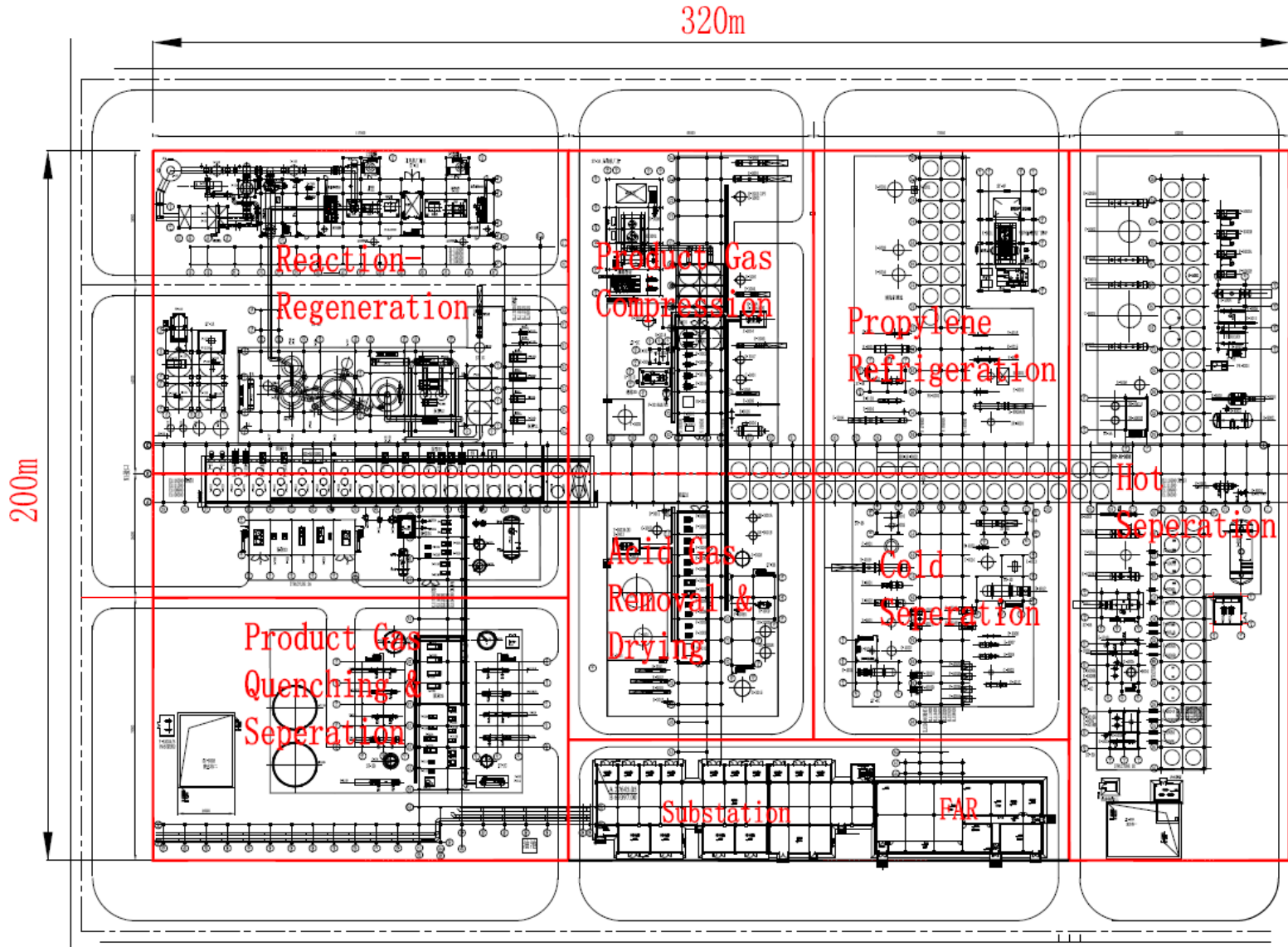
- ① 回收热量和冷量利用QW作为分离部分塔再沸热源
Heat and Cold Recovered. For Example: QW as reboiler heat source to reduce CW Quantity
- ② 采用空冷器 Air Cooler instead of CW for Large Duty Heat Exchanger
 - ◆ 透平表冷器 Surface Condenser of Process Compressor and Propylene Compressor
 - ◆ 丙烯机出口冷却器 Propylene Cooler/Condenser of Propylene Compressor Discharge
 - ◆ 丙烯塔顶冷凝器 C3 Splitter Condenser



- ③ 冷凝水回收 Condensate Collection and Reuse
- ④ 蒸汽分级使用 Several Steam Levels Match Process and Turbine
- ⑤ 与工艺匹配的制冷等级 Several Refrigerant Matching Process to reduce Compressor horse power.

- All inflammable and explosive material collected in closed system
- Organic Oxygenates in Wash water re-feed into Reaction Section after stripping.
- No S in spent Caustic
- Desiccant and Adsorbent be landfilled.
Hydrogenation catalyst be reclaimed by vendor
- SIS be used to protect reactor and important machinery

Plant Area (1800kta)





技术转让业绩 Technology Transfer

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Client	Capacity (Methanol)	Reaction Licensor	Location
SINOPEC	600kta	ST	HENAN, CHINA
SINOPEC/CHINACOAL	2X1800kta	ST	NEIMENG, CHINA
SINOPEC/ANHUI	1800kta	ST	ANHUI, CHINA
SIERBANG	2400kta	UOP	JIANGSU, CHINA

Easy to operate!

High recovery!

High reliability!

Client's best selection!

