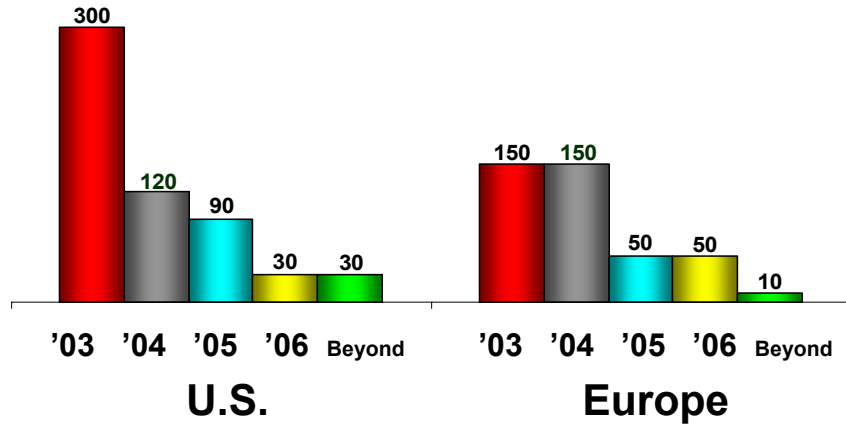
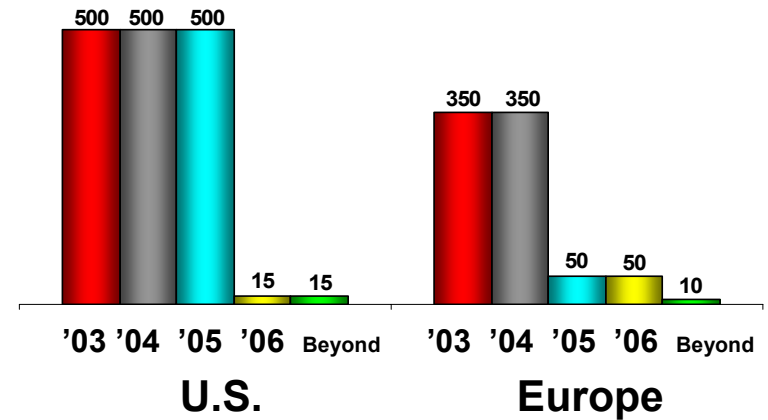


Regulatory Changes Impacting Supply

Maximum Gasoline Sulfur Content (PPM)



Maximum Diesel Sulfur Content (PPM)

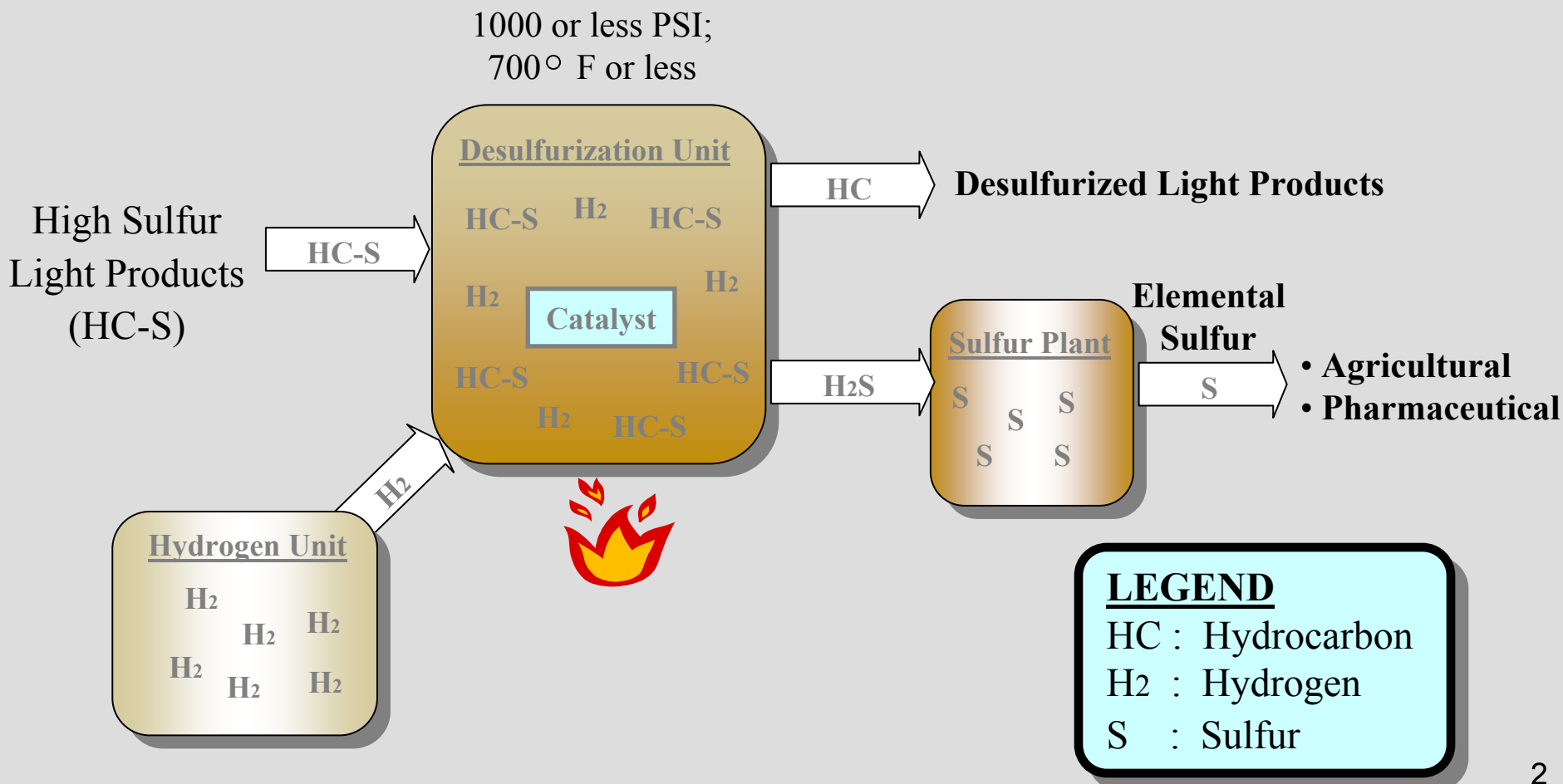


- ❑ Major specs changes in the U.S. in 2006
 - ❖ Gasoline spec change from 90 ppm corporate average to 30 ppm at 1/1/06
 - In addition, batch limit spec change from 300 ppm to 80 ppm at 1/1/06
 - ❖ Diesel spec change from 500 ppm to 15 ppm at 6/1/06 at the refinery level
 - Transition period to 10/15/06 at the retail level
- ❑ Capital diverted to regulatory compliance limiting capacity growth
- ❑ U.S. Refining Industry expected to invest around \$20 billion for Tier II

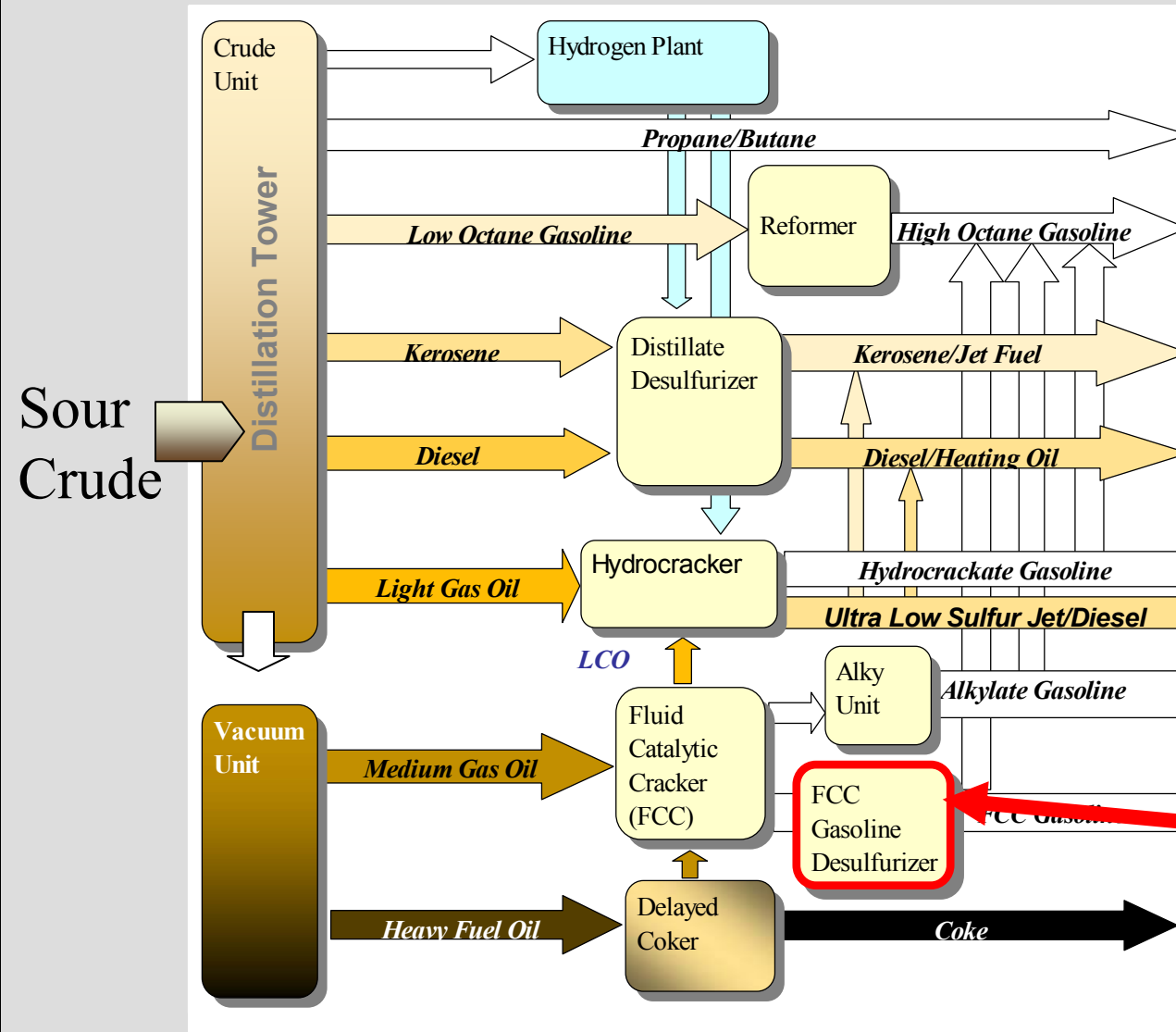
Desulfurization Basics

Goal

- Remove sulfur from light products (gasoline or diesel) to meet air quality requirements for clean burning fuels



Gasoline Desulfurization



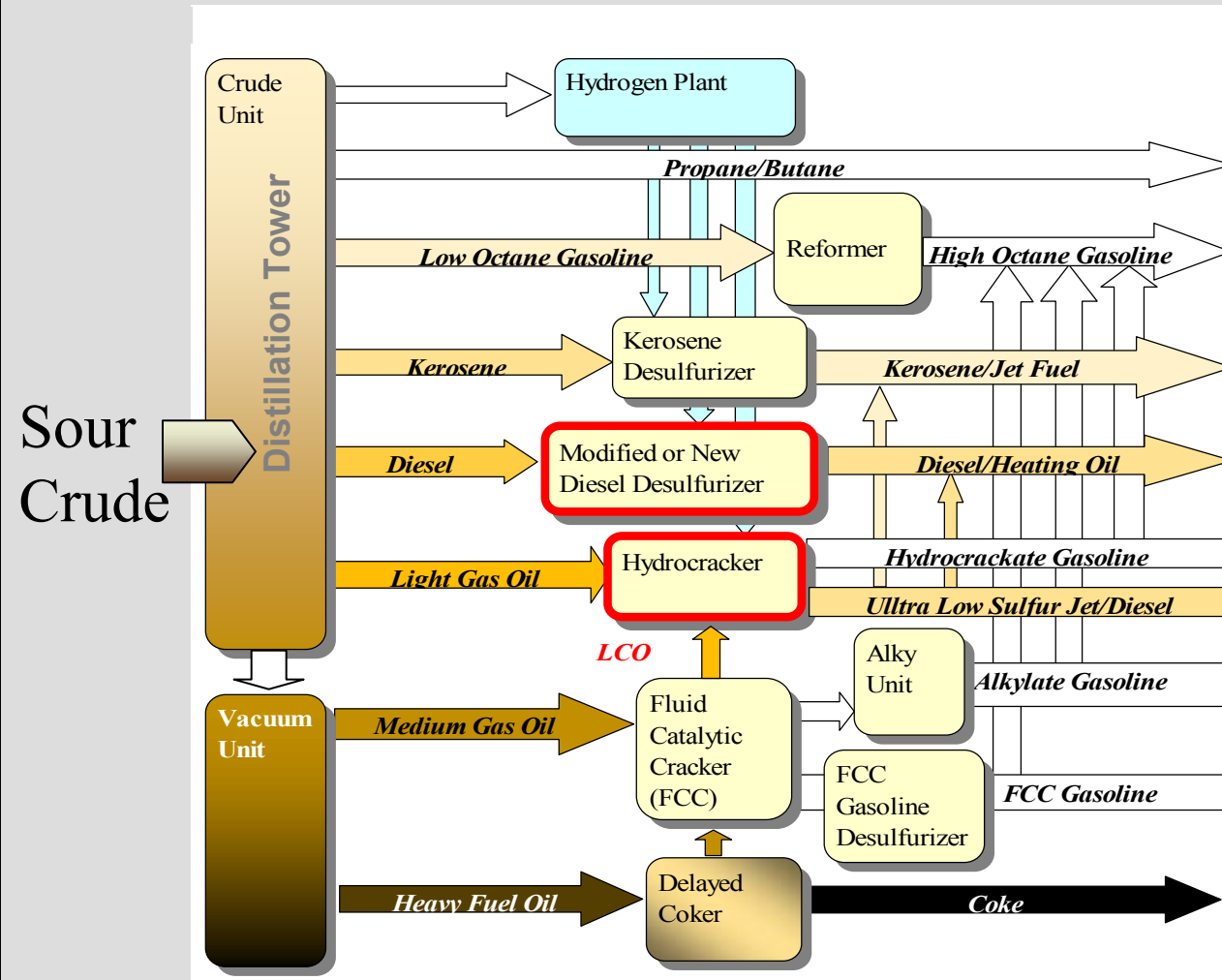
- ❑ Significant capital investment
- ❑ Lower FCC gasoline octane (yield loss)
- ❑ Other Options
 - ❖ Desulfurize FCC feed
 - ❖ Shift FCC gasoline into distillate

Install New FCC Gasoline Desulfurizer

St. Charles Gasoline Desulfurizer



Diesel Desulfurization

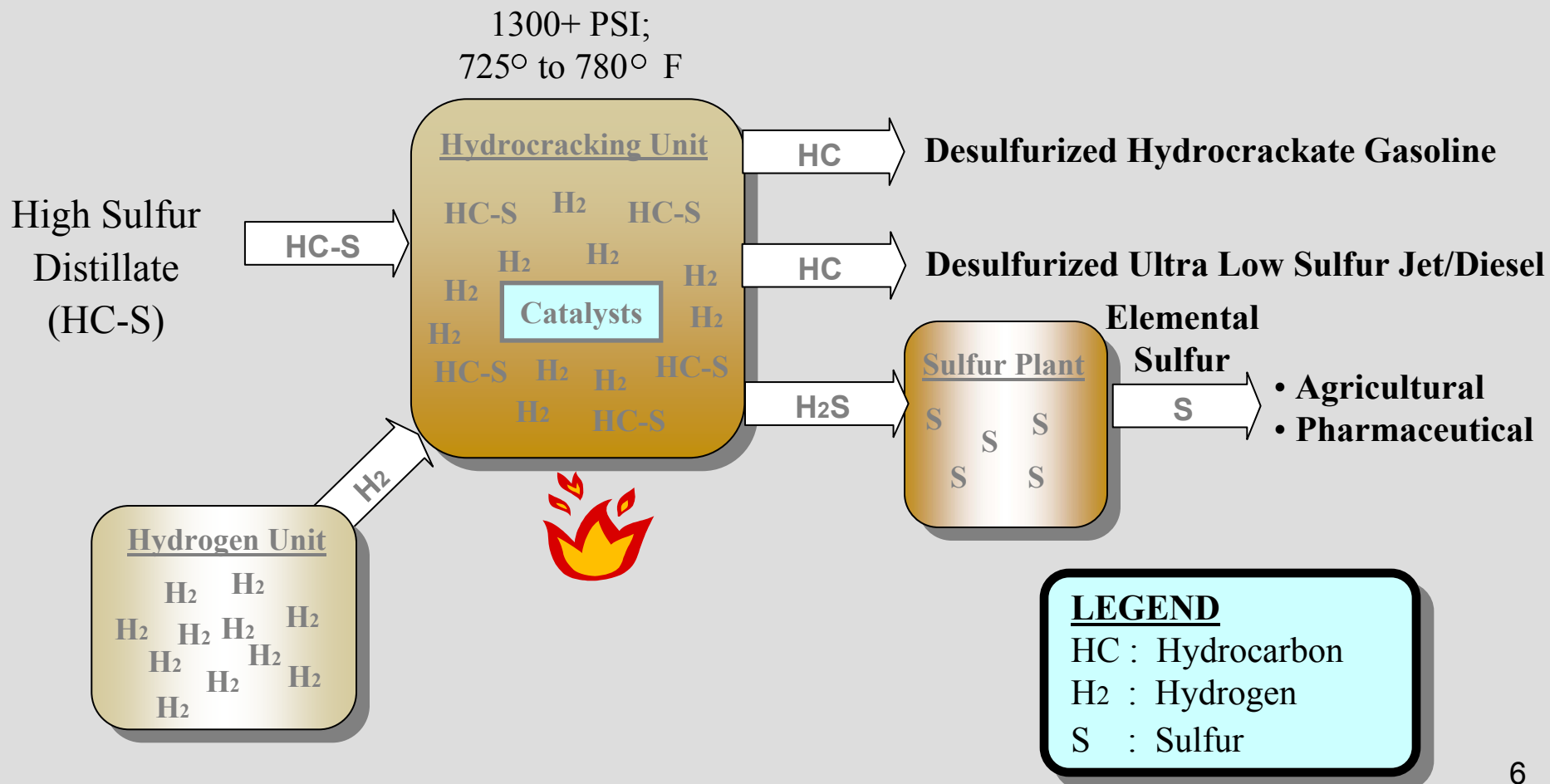


- ❑ Significant capital investment and time
- ❑ Diesel yield loss
- ❑ Options
 - ❖ No capital investment – Sell LCO on the spot market
 - ❖ Modify or add new diesel desulfurization unit
 - ❖ Modify or add new hydrocracker

Hydrocracking Basics

Goal

- Value added upgrading of high sulfur distillates to low sulfur gasoline and ultra low sulfur jet/diesel to meet air quality requirements for clean burning fuels



Hydrocrackers



McKee Hydrocracker



Lima Hydrocracker