



AXENS' IRAN SEMINAR

PAVING THE WAY TO A HIGHLY COMPETITIVE IRANIAN REFINING INDUSTRY
TEHRAN - 29/30 TIR 1395 (19/20 JULY 2016)

Axens Consulting Services Upgrading Refinery to Achieve New Product Specifications and to Minimize the Residue



Payam Heidararabi

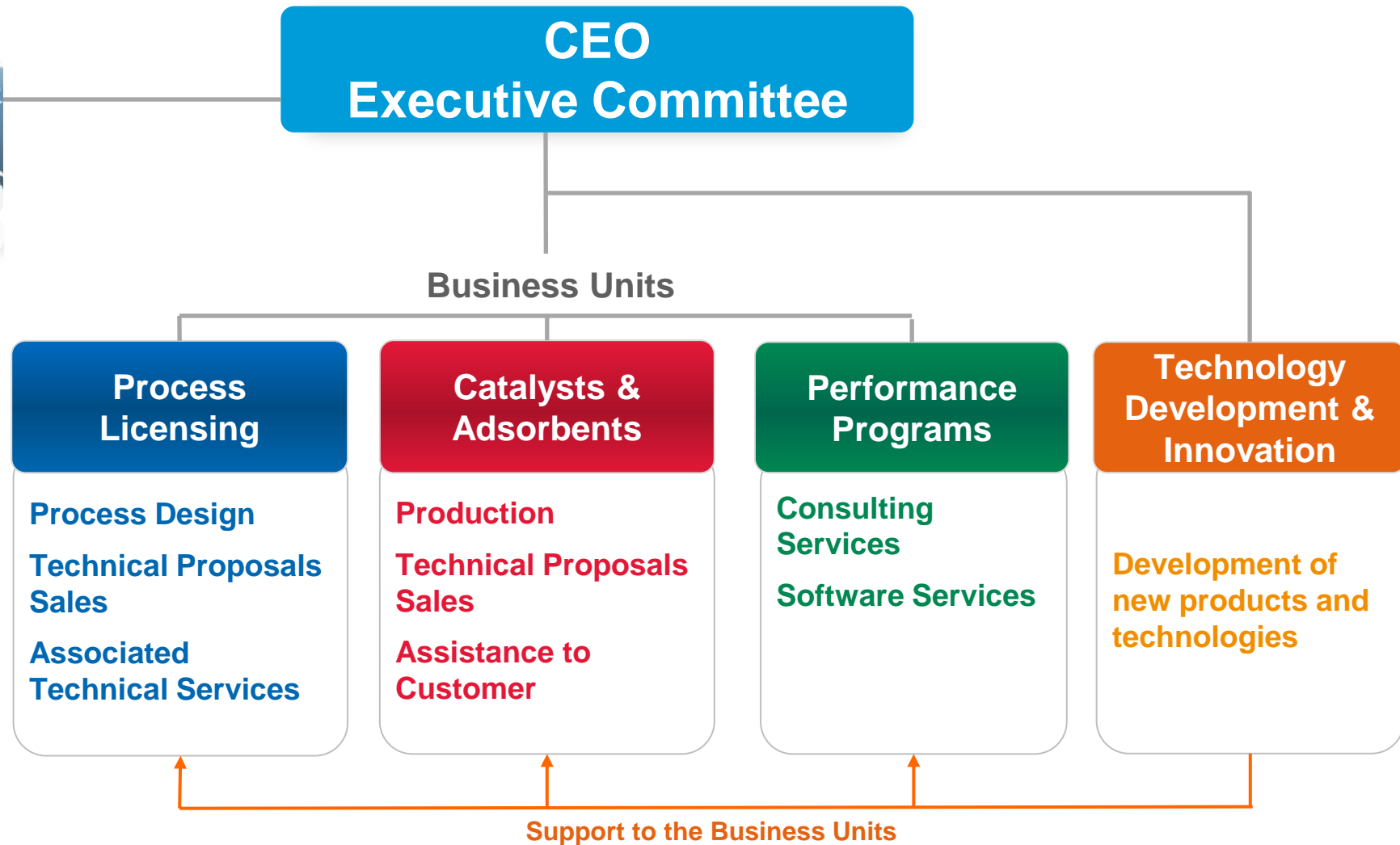
- **Introduction of Axens Consulting Services**

- **Case study**
 - **Background and Objectives**
 - **Solution developed by Axens**
 - **Economic Evaluation**

- **Conclusion**

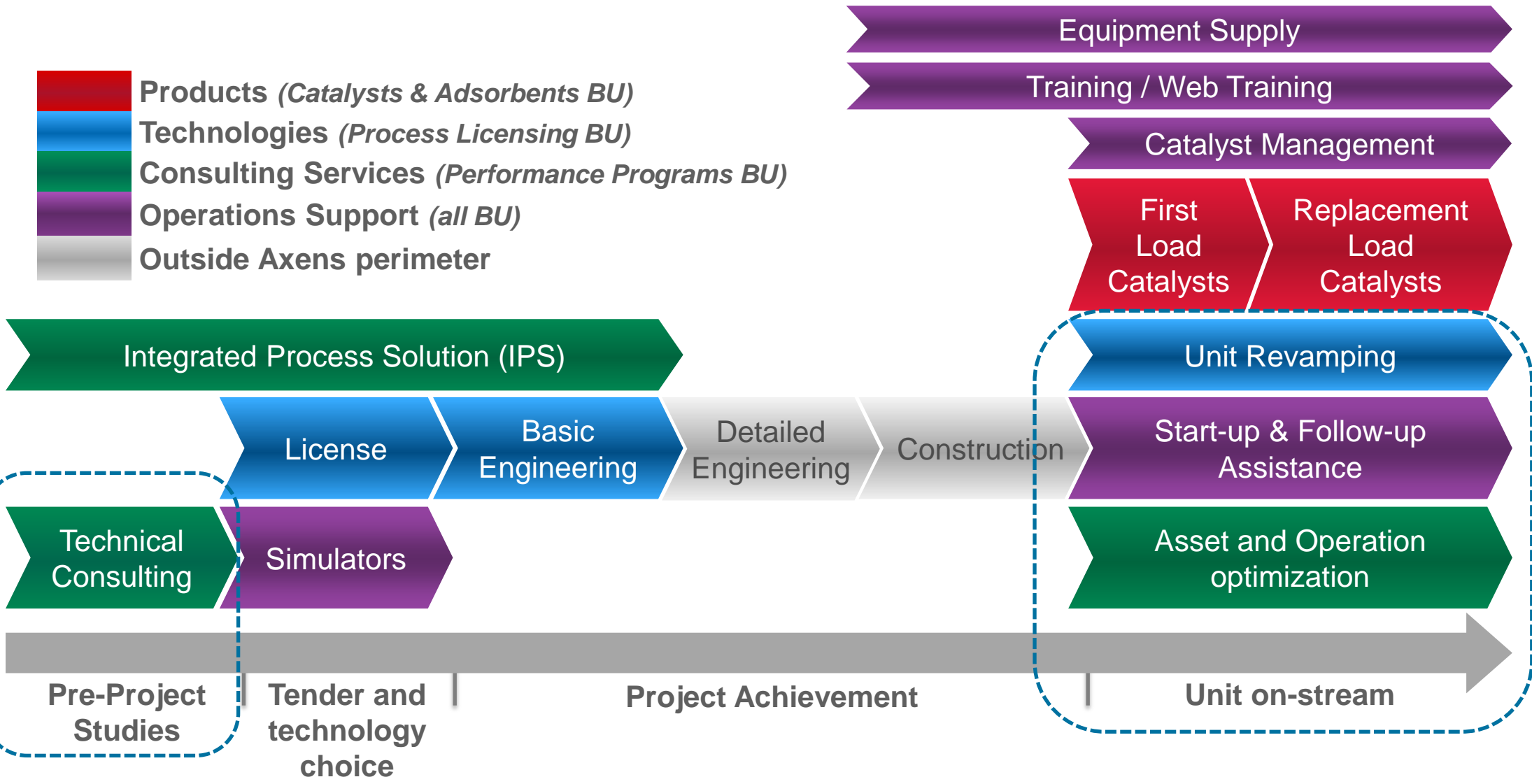
Operational Organization

9 Subsidiaries



How Do We Operate?

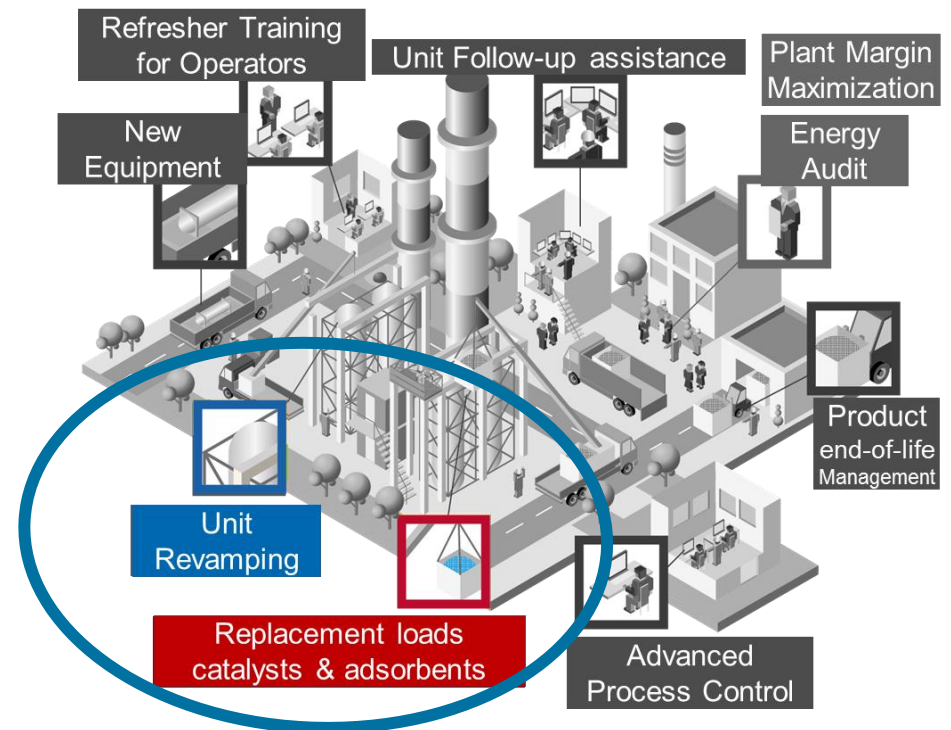
- Products (*Catalysts & Adsorbents BU*)
- Technologies (*Process Licensing BU*)
- Consulting Services (*Performance Programs BU*)
- Operations Support (*all BU*)
- Outside Axens perimeter



Modern Refinery has Multiple Challenges...

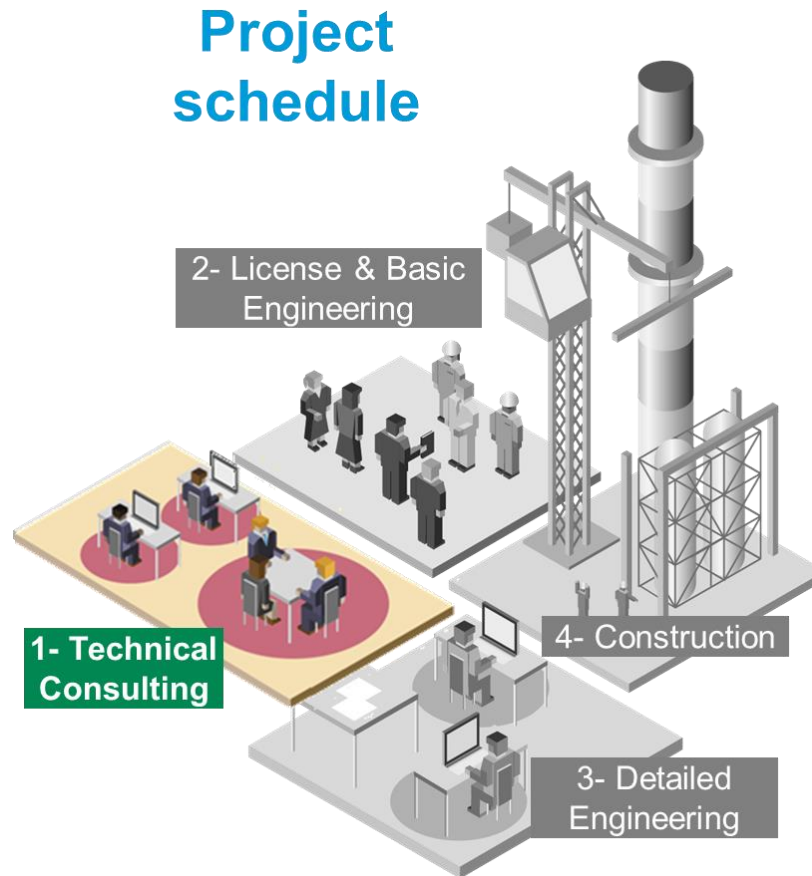
1. How to take the right decision for expansion or upgrading to cope with new market requirements?
2. How to boost performance of the units with advanced control technologies?
3. How to optimize the margin to be more competitive?

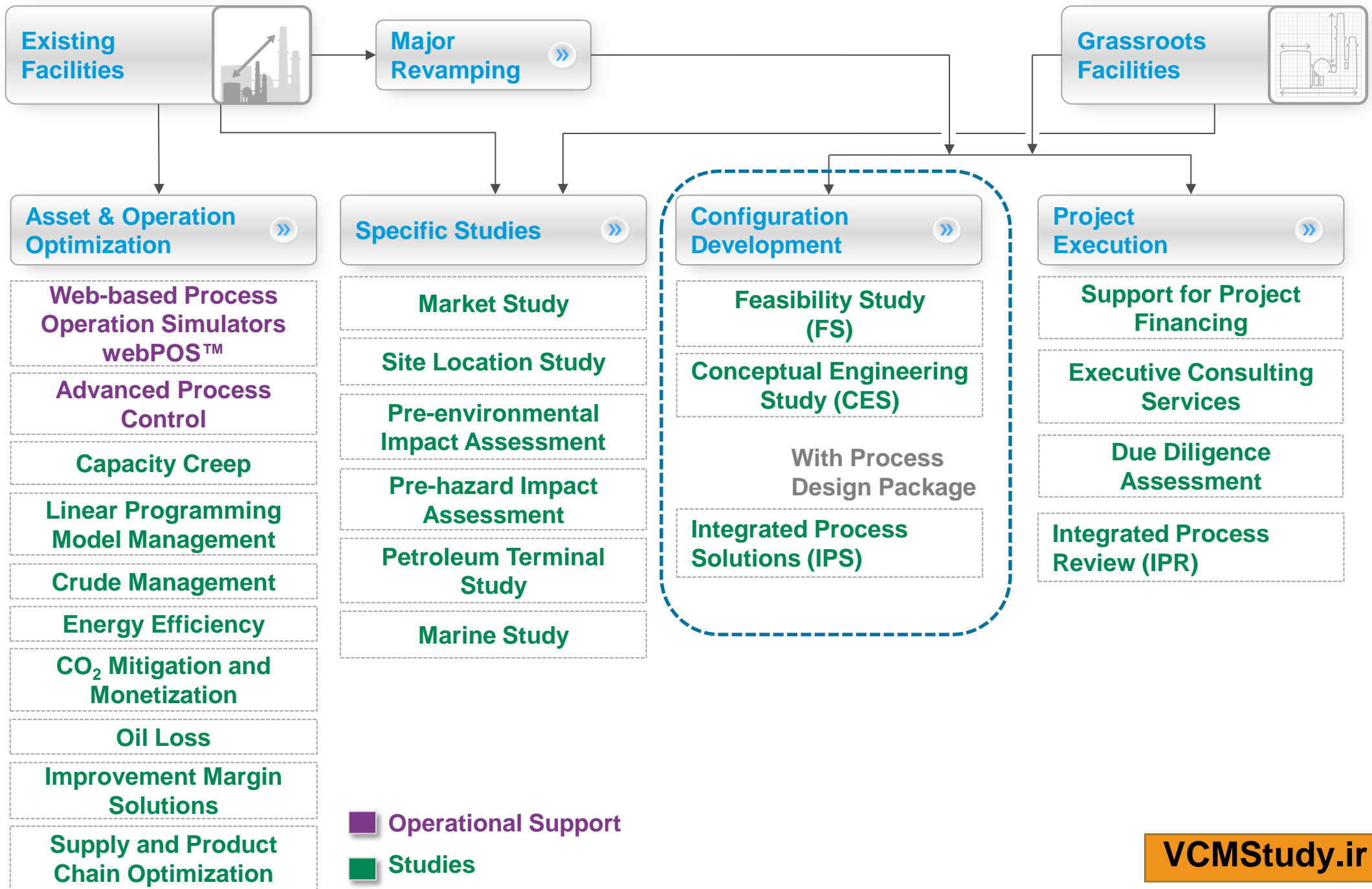
Unit on-stream



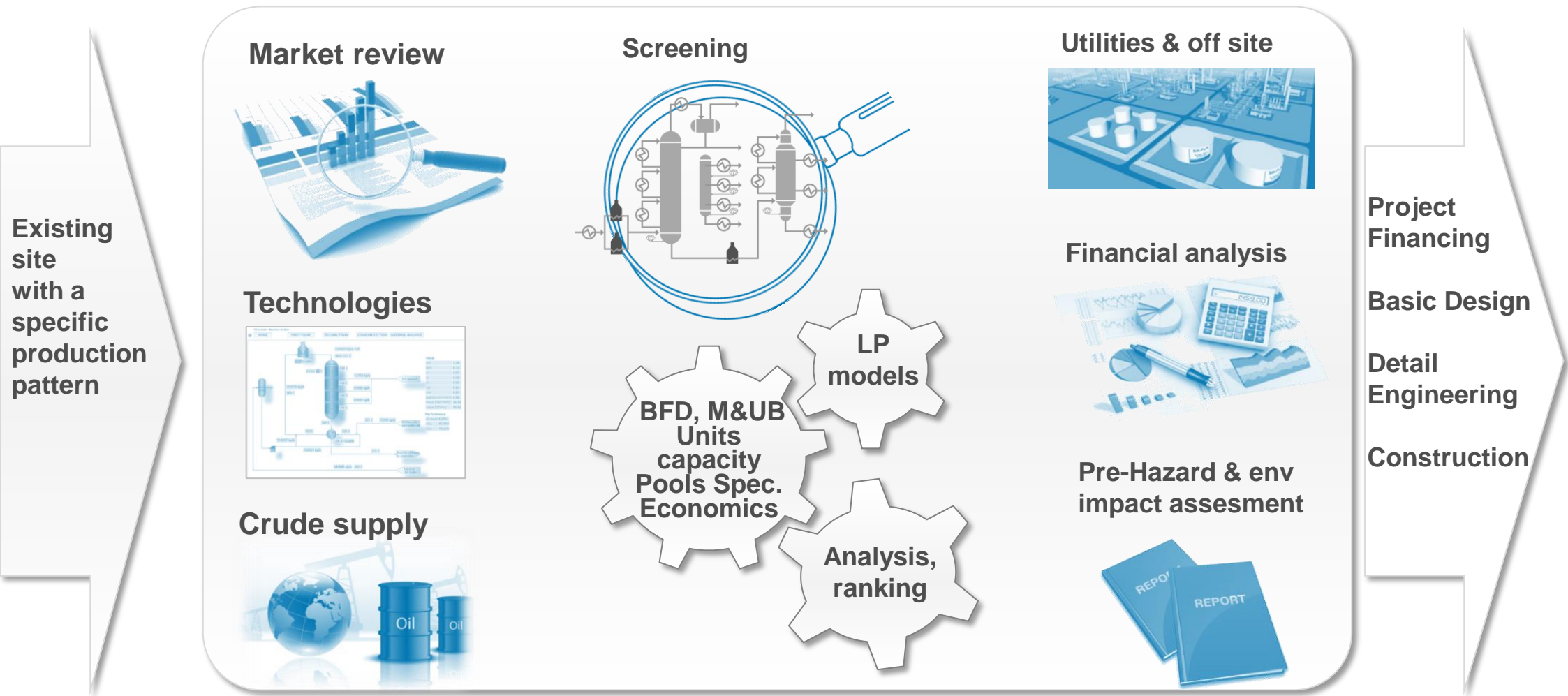
Axens Consulting Services: Taking Right Investment Decision and Minimizing Risks

*“I’m finding it difficult to take the right investment decision to meet new specifications efficiently while maximizing the revenue”
Refinery management*





the Path to optimum investment decisions and maximum refinery profitability



Agenda

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- Axens has been consulted in 2012 to carry out a study for **improving quality of fuel while maximizing the bottom conversion** to valuable products
- Main objectives of the upgrading project
 - **Comply** with the latest **specifications** for diesel, gasoline, fuel oil & asphalt
 - **Increase motor fuels & LPG production** in order to minimize the imports
 - **Upgrade vacuum residue**

- **Strong LPG demand**
 - Higher demand than domestic production
 - Demand currently met by imports
- **Gasoline Specification**
 - About 75% of the Gasoline consumption is low-octane Gasoline.
- **Noticeable Fuel Oil consumption** mainly for Power Generation

■ Gasoline

- Sulfur content reduction from 750/1000 to **10 wppm max**
- Increase of RON (from 81/90 to **91/95**)
- Aromatics content **35 vol% max** & Olefins content **18 vol% max**
- Stringent specification on Benzene content **0.6 vol% max**

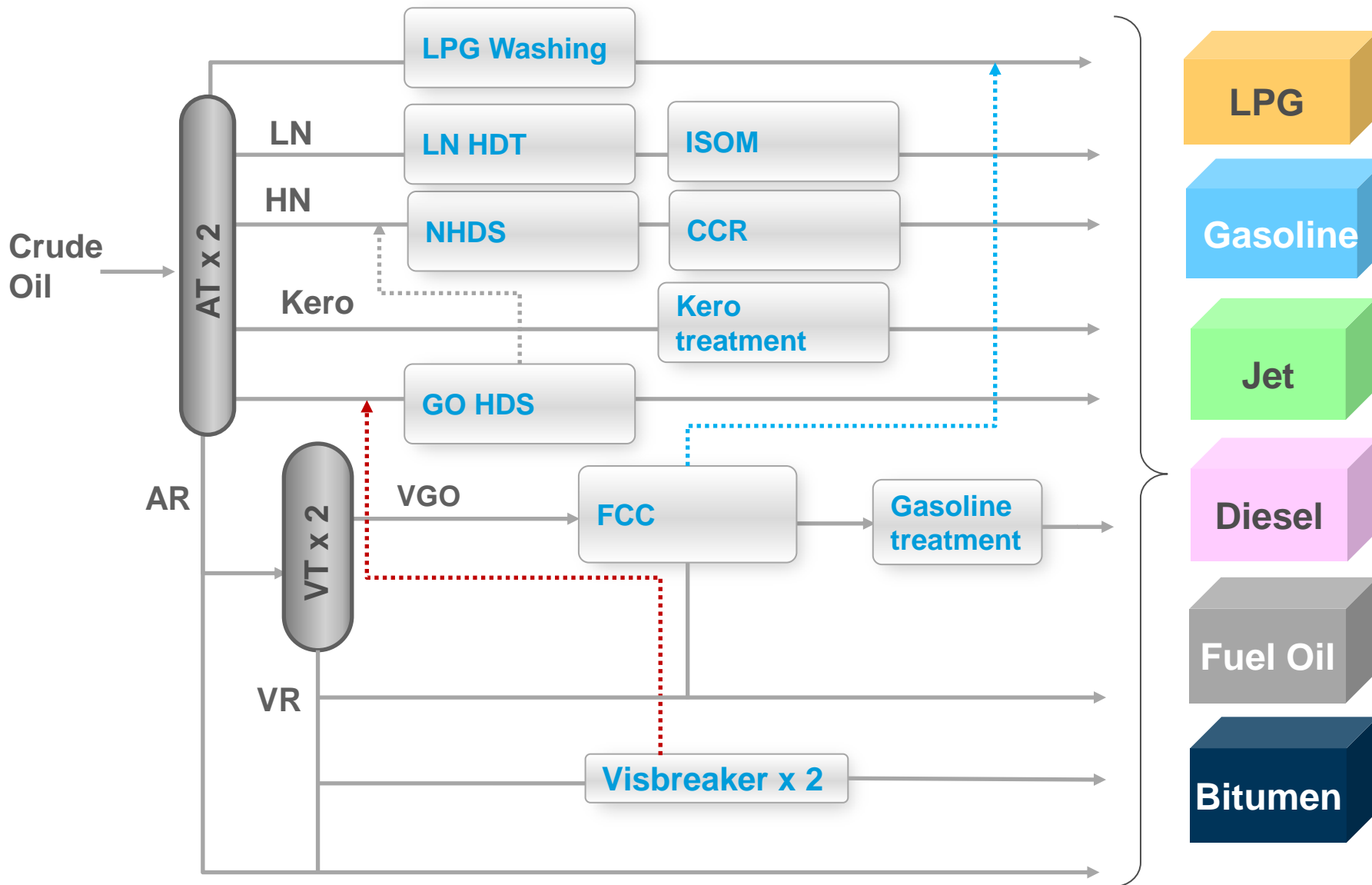
■ On-road Diesel

- Sulfur content reduction from 7000/500 (different grades) to **10 wppm max**
- Polyaromatics **11 vol% max**
- Increase of Cetane Index (from 45 to **52**)

■ Fuel Oil

- Sulfur content reduction in order to comply with SO₂ emission regulation

Initial Refinery Configuration



- Same crude as the one currently processed

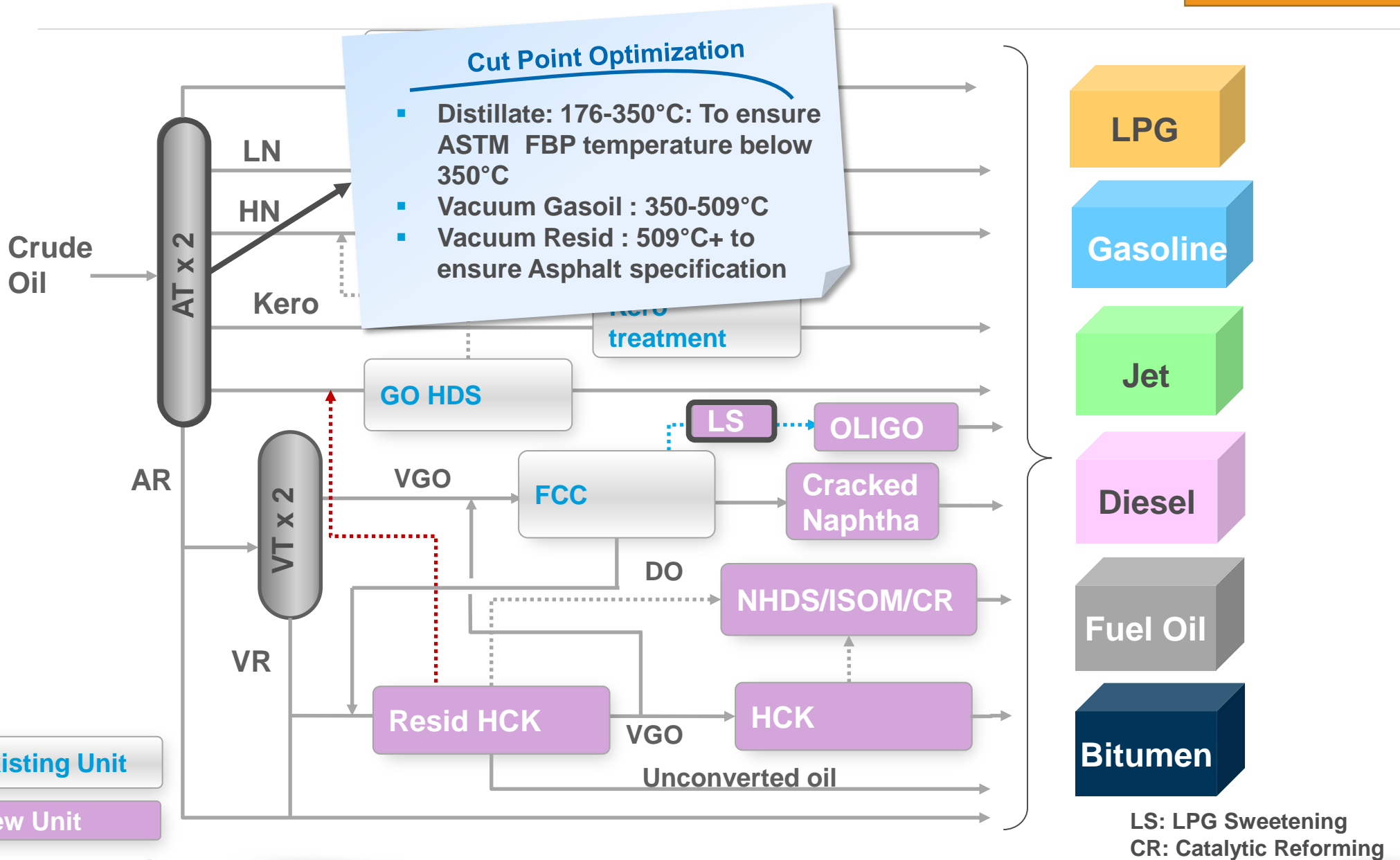
Properties	Value
API gravity, °API	23.1
Specific Gravity @ 60°F	0.9153
Sulfur, %wt	1.54
Nitrogen, wt ppm	3 358
Kinematic viscosity @ 40°C, cSt	52.7
Conradson Carbon, %wt	10.0
Nickel, wt ppm	77
Vanadium, wt ppm	207

- Introduction of Axens Consulting Services

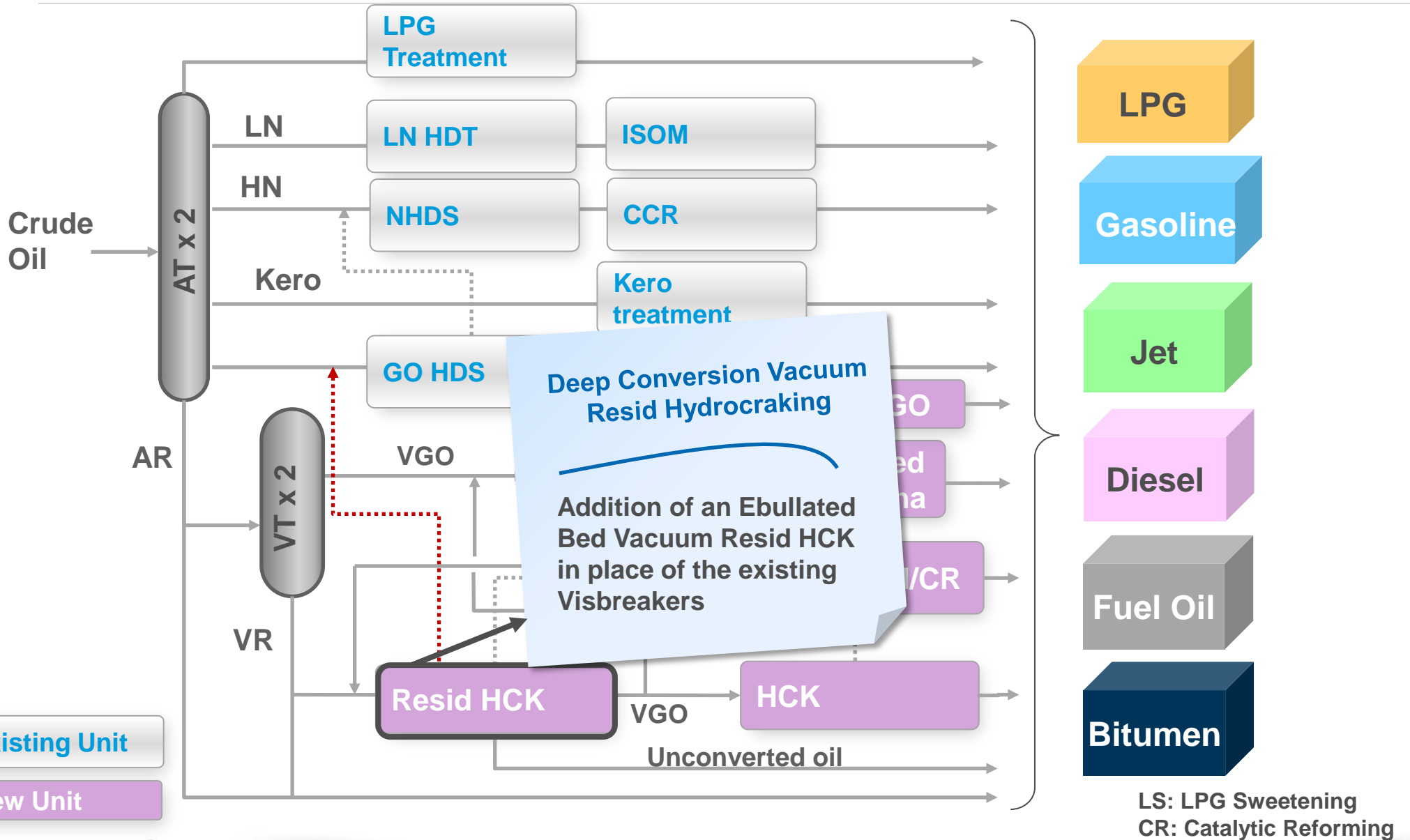
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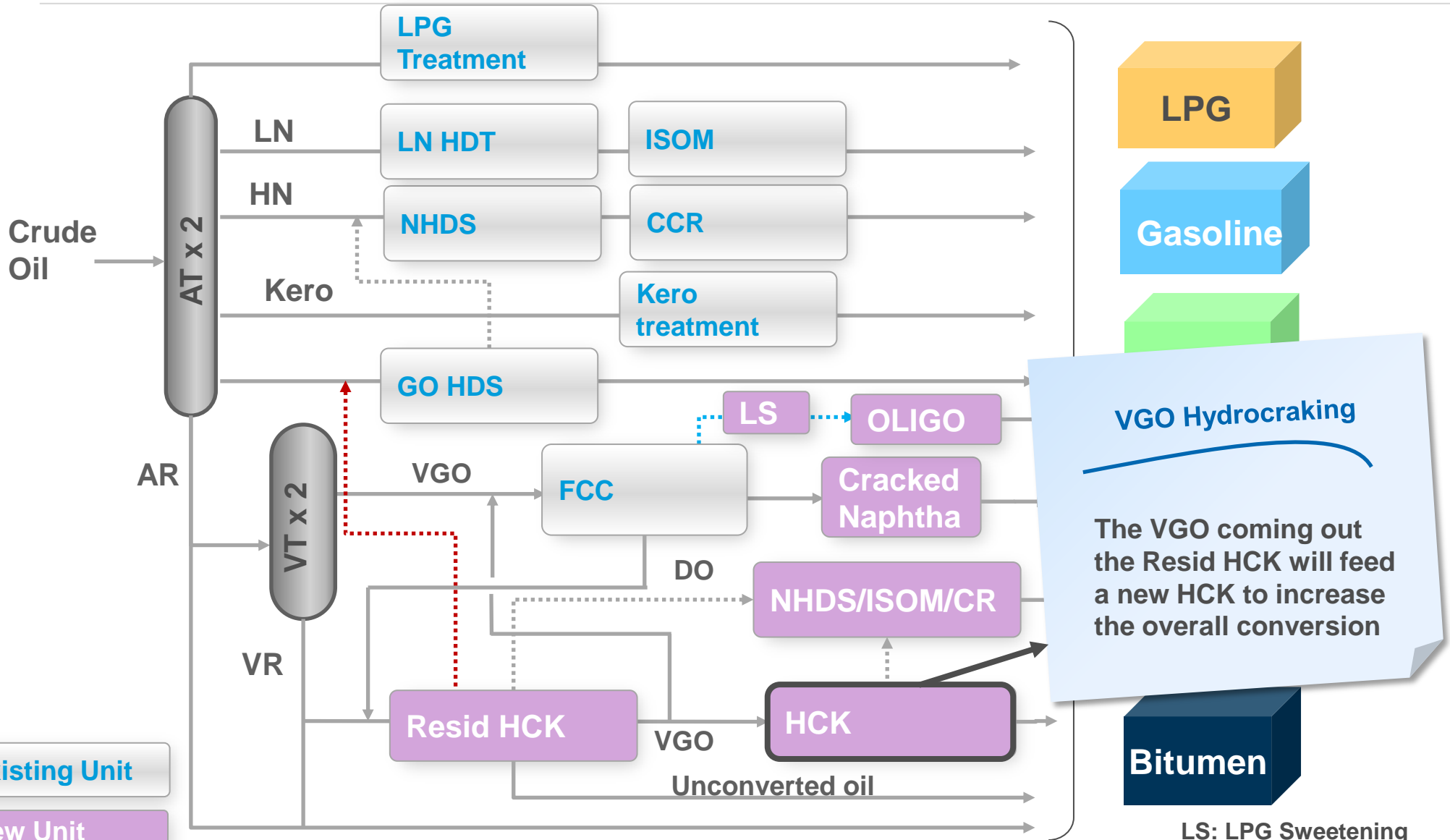
Developed Solution for Distillates and Bottom of the Barrel



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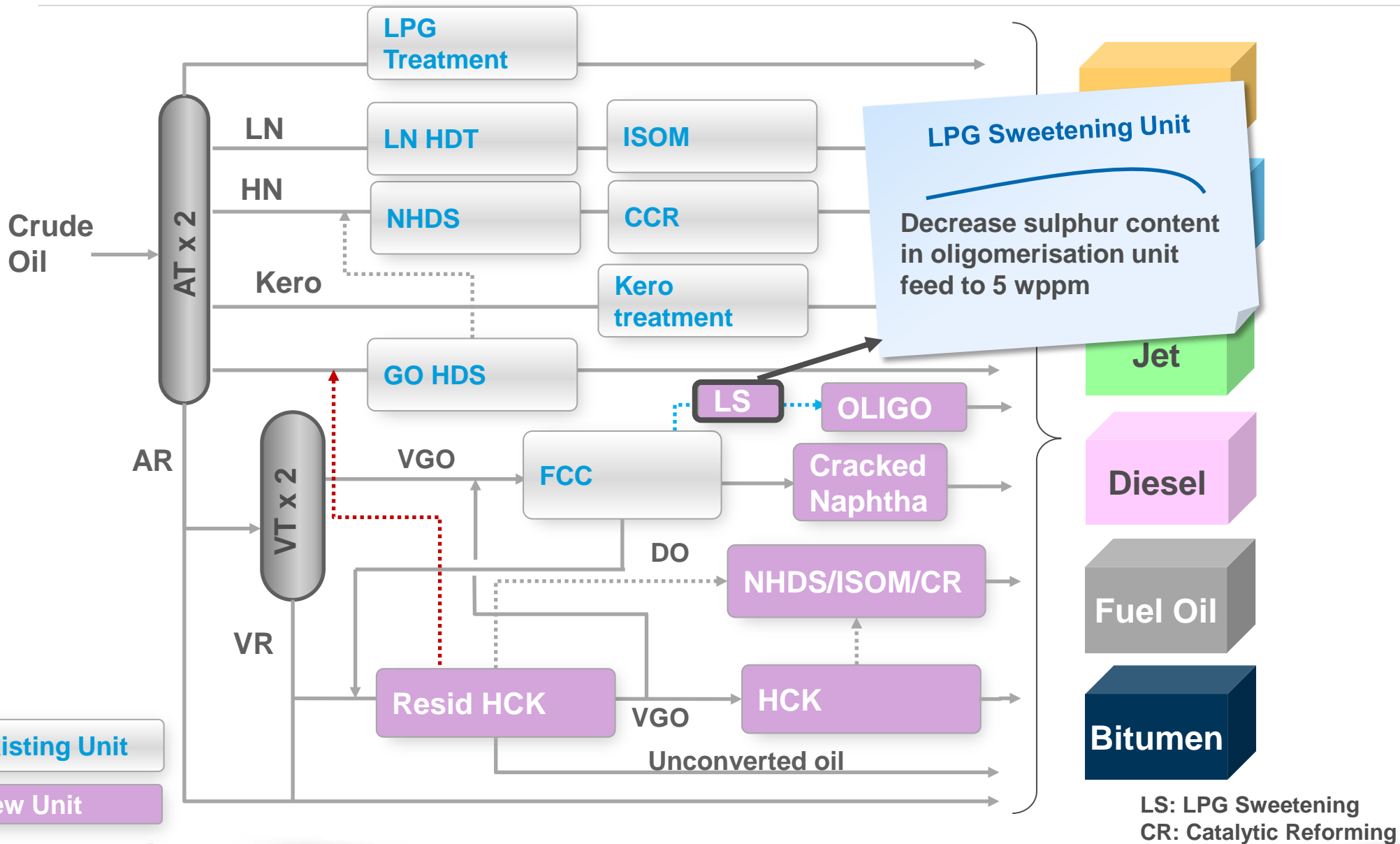


Existing Unit
New Unit

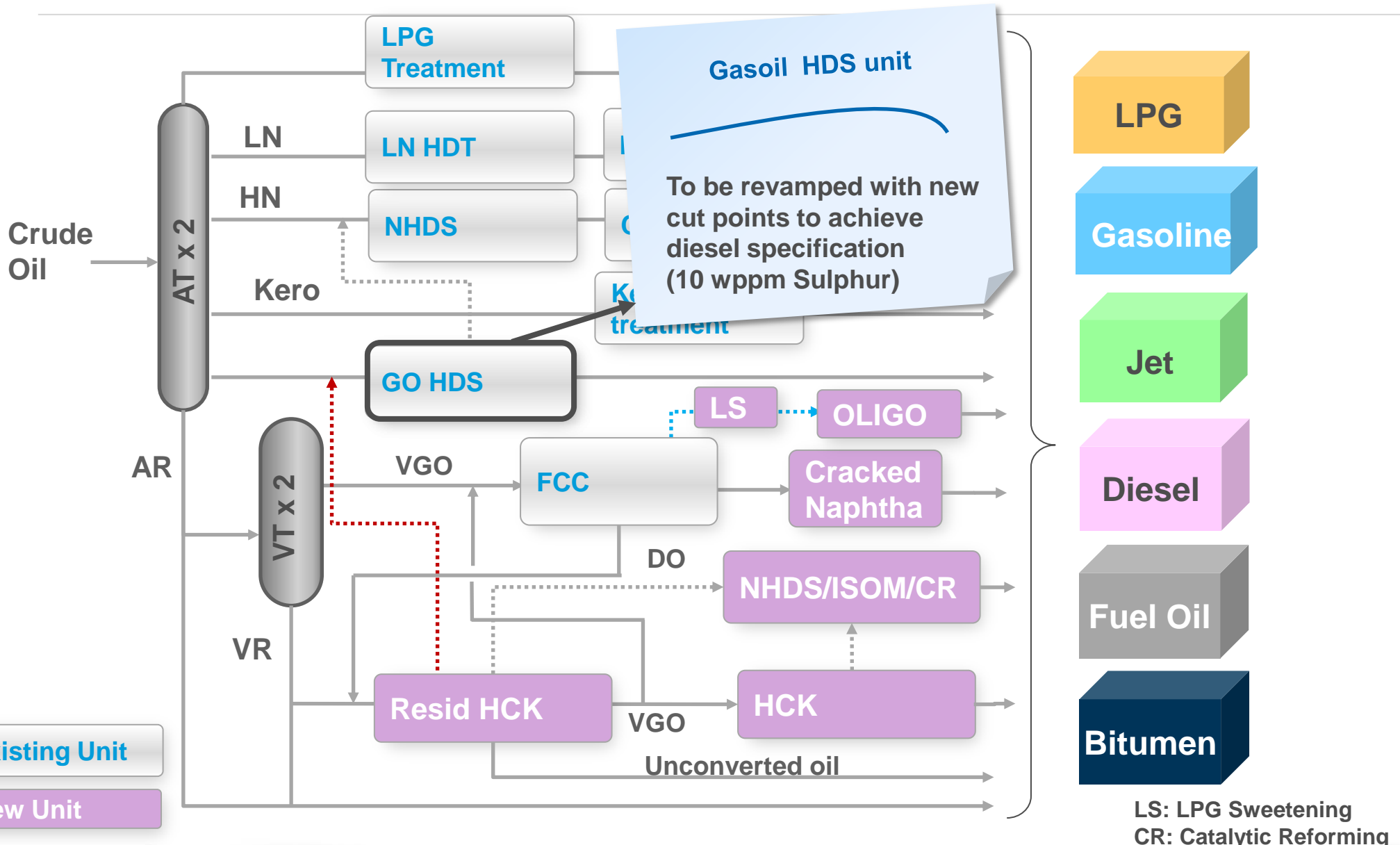
LS: LPG Sweetening
CR: Catalytic Reforming



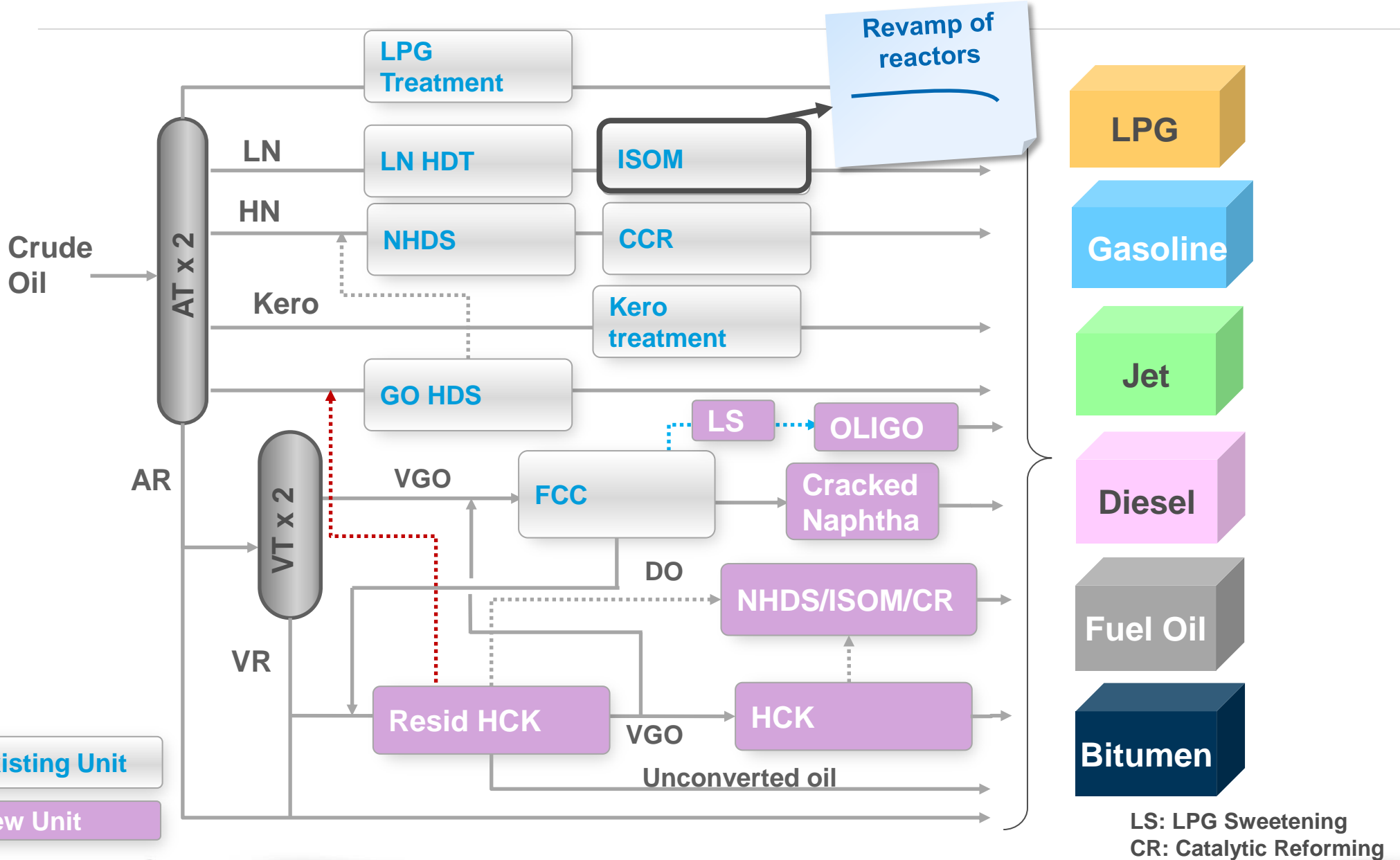
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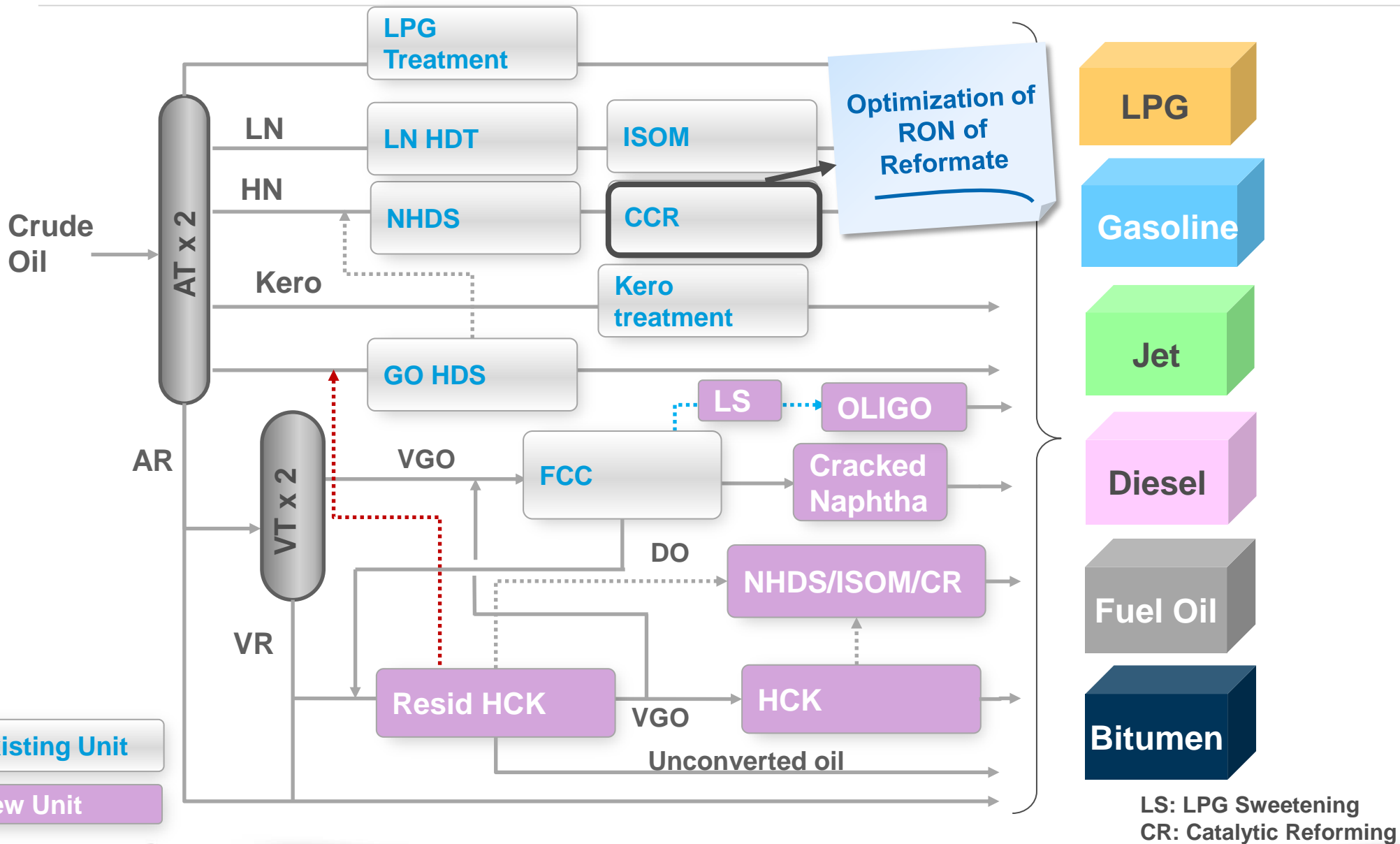
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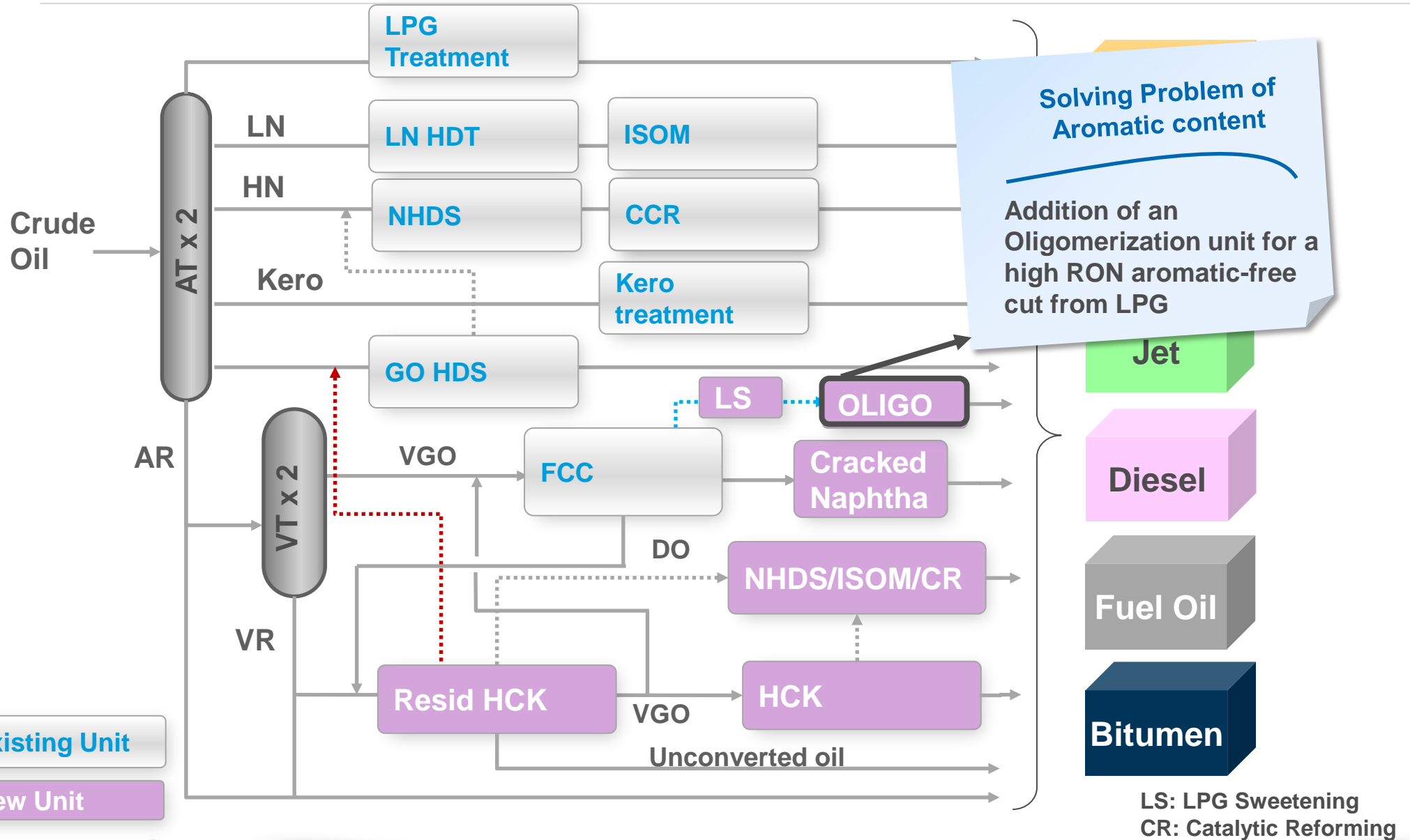


Developed Solution for Distillates and Bottom of the Barrel

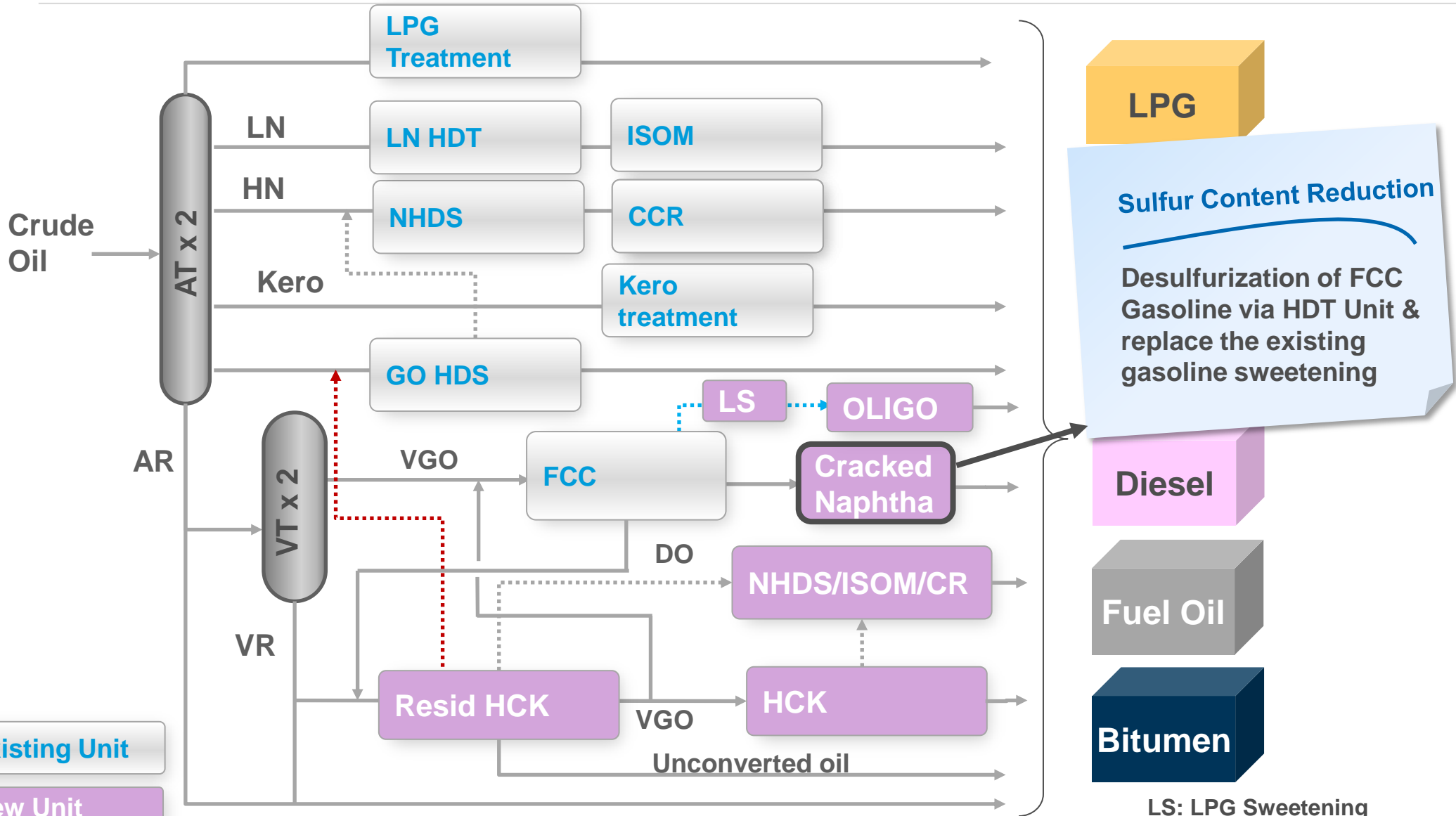


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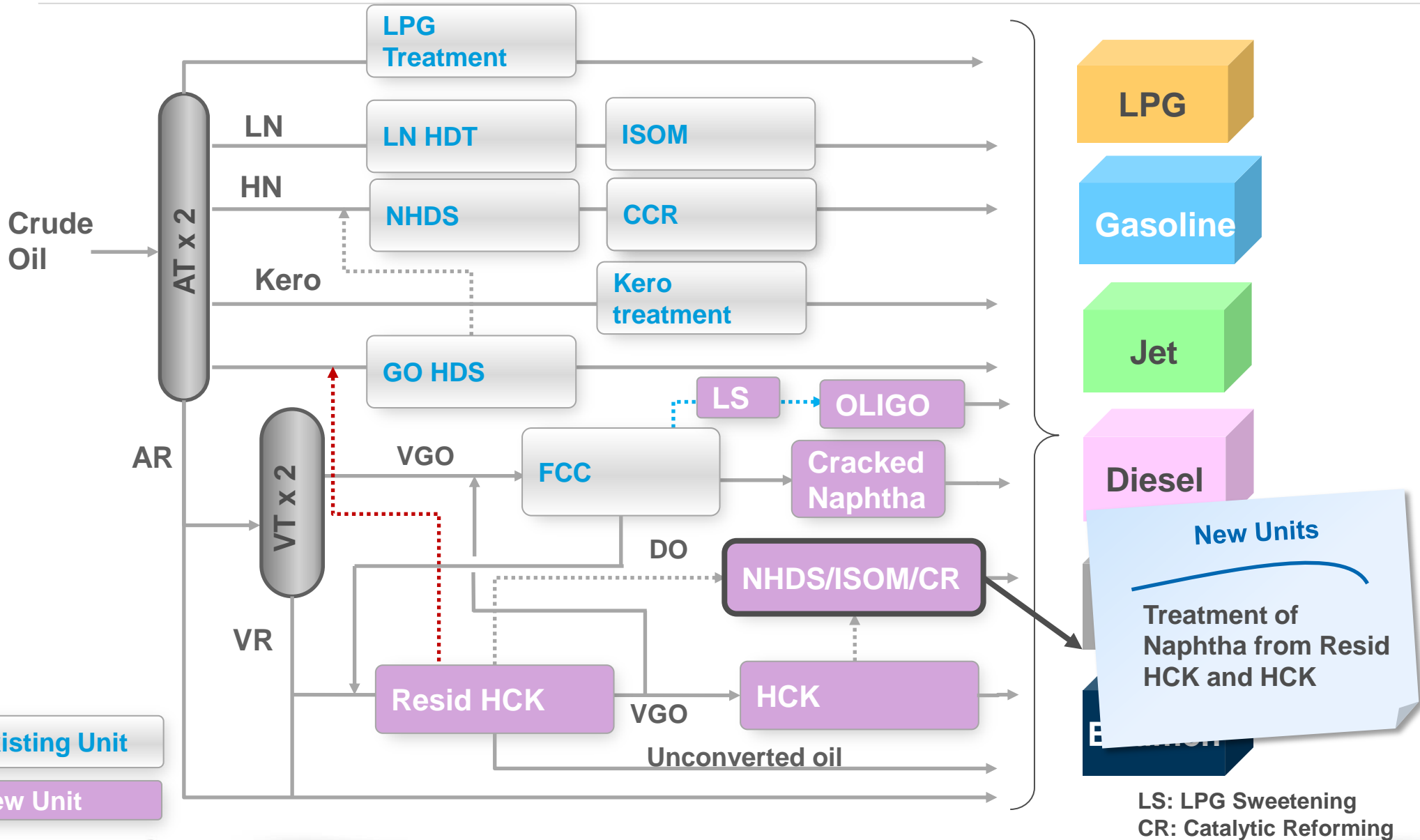


LS: LPG Sweetening
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Existing Unit
 New Unit



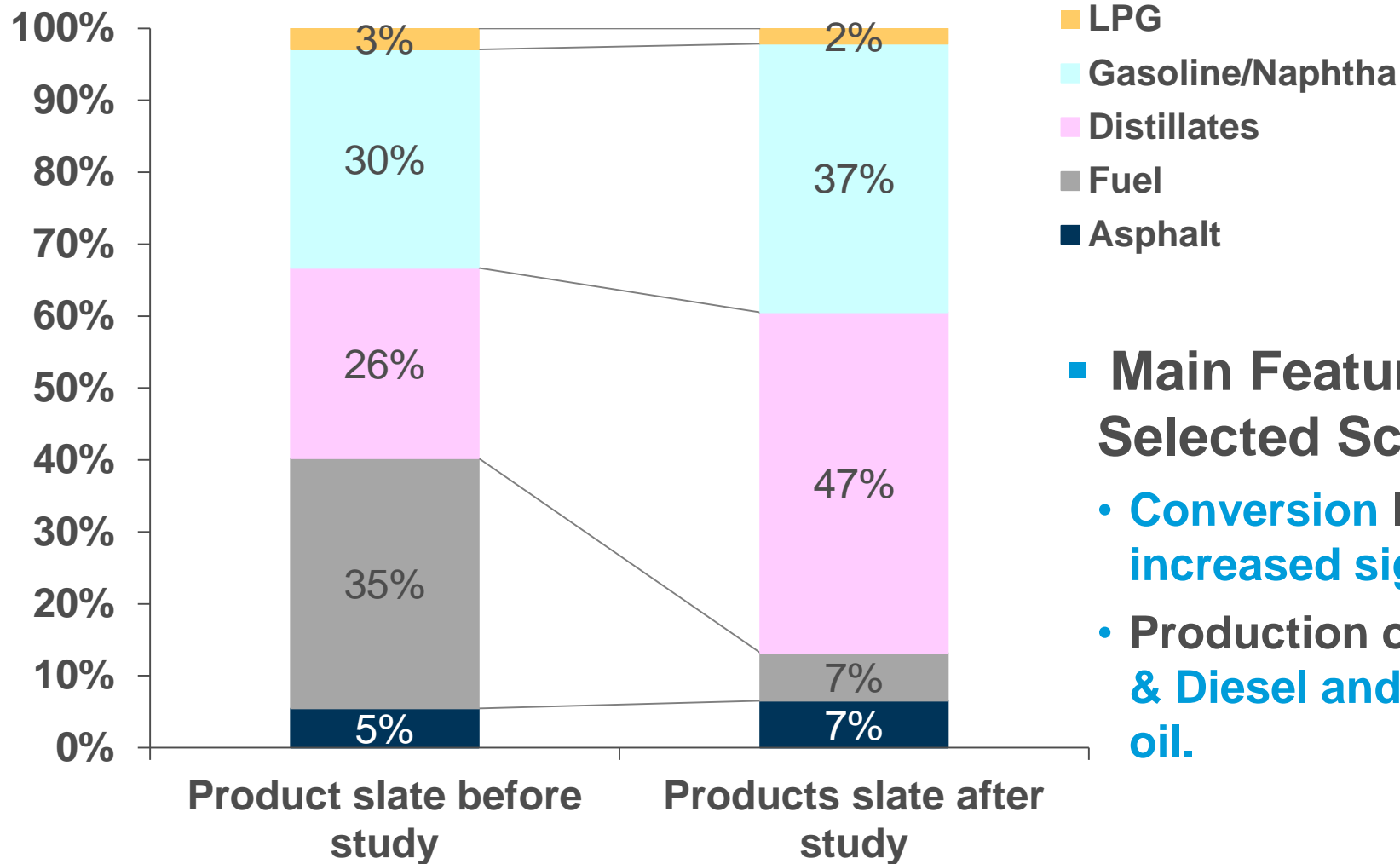
Developed Solution for Distillates and Bottom of the Barrel



Developed Solution Supporting and Auxiliary Units

- **Addition of an Hydrogen Production Unit to satisfy Hydrogen consumption of HDT, VGO HCK and VR HCK units**
- **Addition of environmental dedicated units**
 - Amine Washing and Regeneration facilities
 - Sour Water Stripper
 - Sulfur Recovery Unit for H₂S removal

Refinery Product Slate after Study



■ Main Features of the Selected Scheme

- Conversion level of the refinery increased significantly
- Production of Euro V Gasoline & Diesel and low sulphur fuel oil.

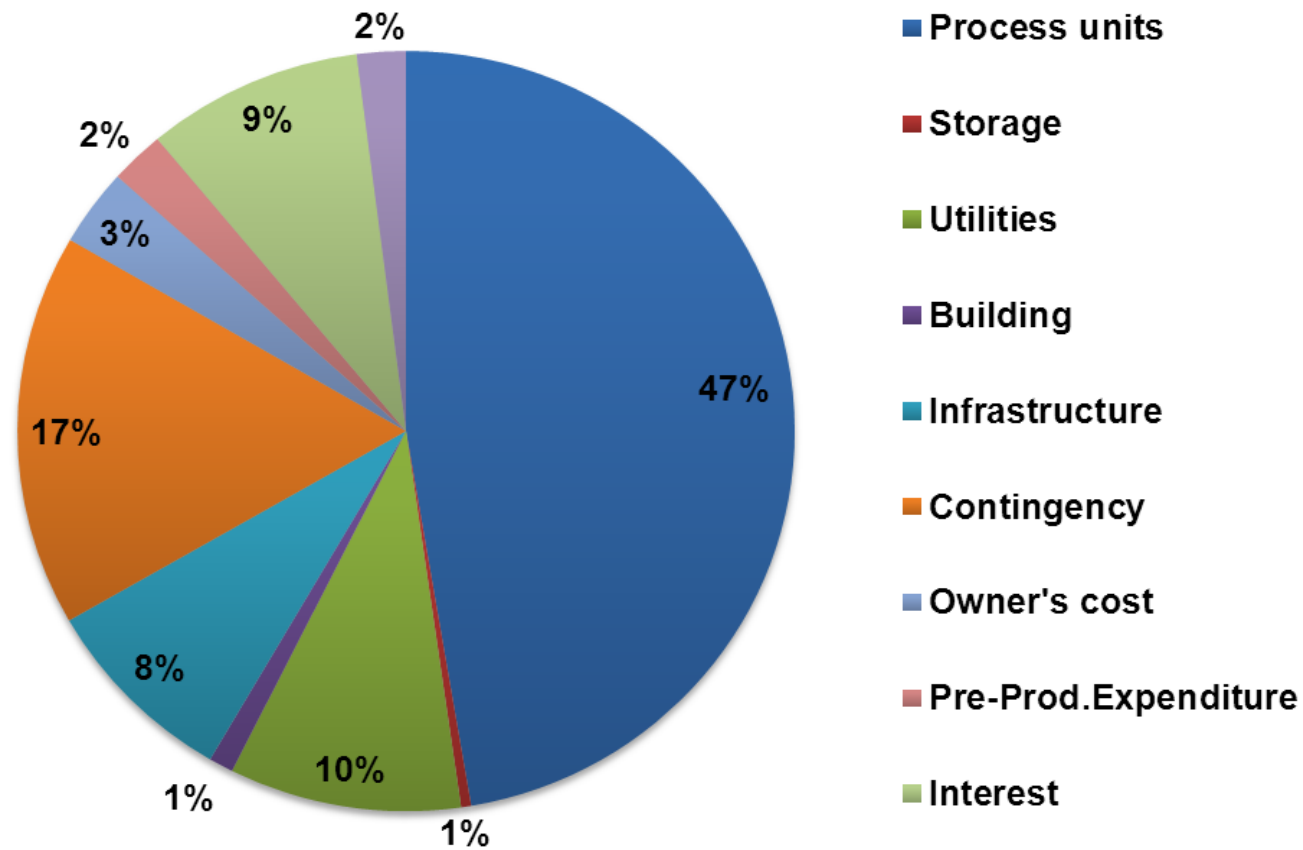
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Total Project capital requirement ~



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- The project reveals **interesting opportunity in upgrading the refinery** to comply with new specifications
- In addition to the main bottom upgrading process units, **the detail review of existing units, auxiliaries and infrastructures is also important** for decision making
- Axens' **technology know-how combined with linear programming tool and expertise** in analysis of project economic lead the study to the **most feasible solution**

Axens Succeed Together Blog axens.net/blog

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