

Safe Innovative Approach for Commissioning & Startup of Mega Oil Refinery Complex

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Agenda

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1. Introduction

2. Startup Limitations Vs Proposed Solution

3. Approaches to Startup Options

4. Debottlenecking Selected Option

5. Hydrogen Handling

Introduction

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01



Saudi Aramco Jazan Complex

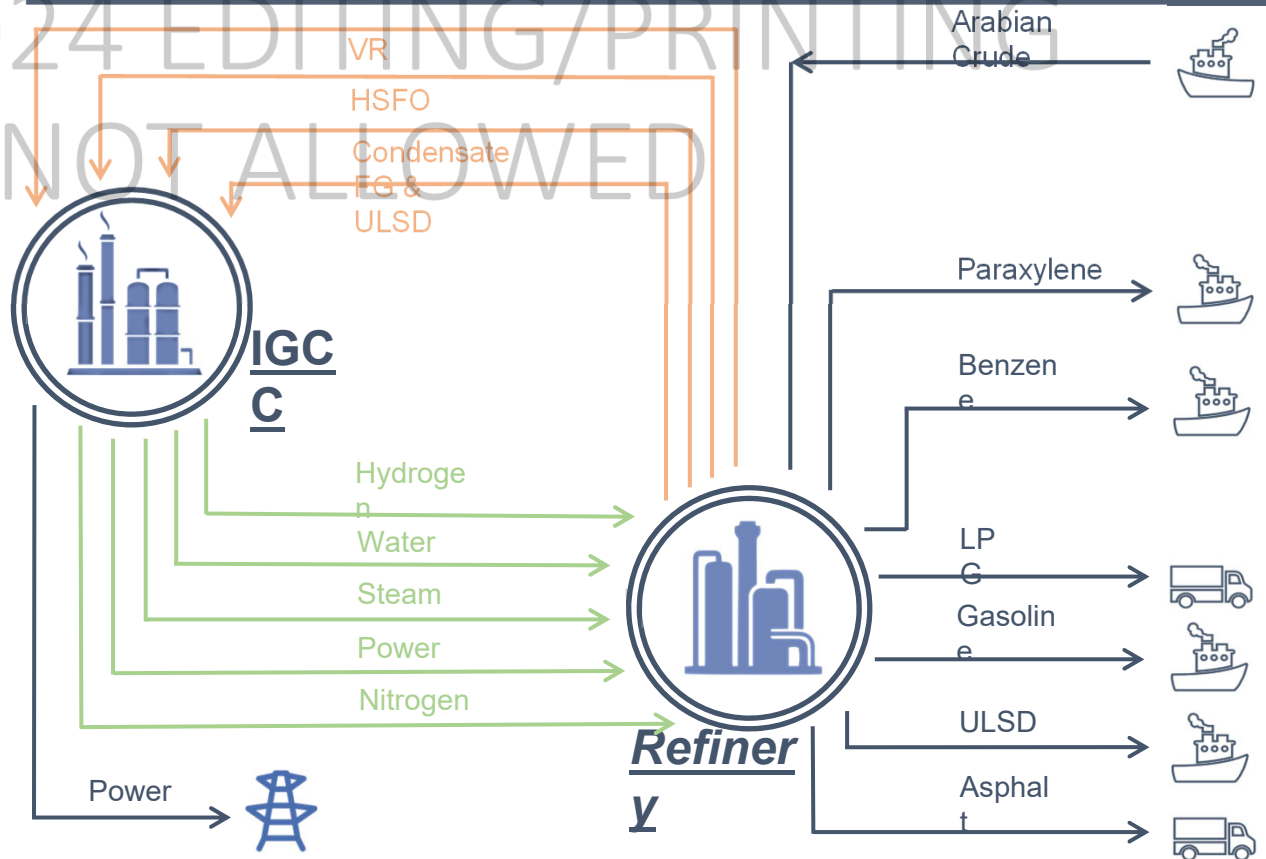
Complex Overview

Full Conversion Oil Refinery
 Integrated with Gasification Combined Cycle (IGCC)

Capacity: 400 MBD
 Power: 3.8 GW

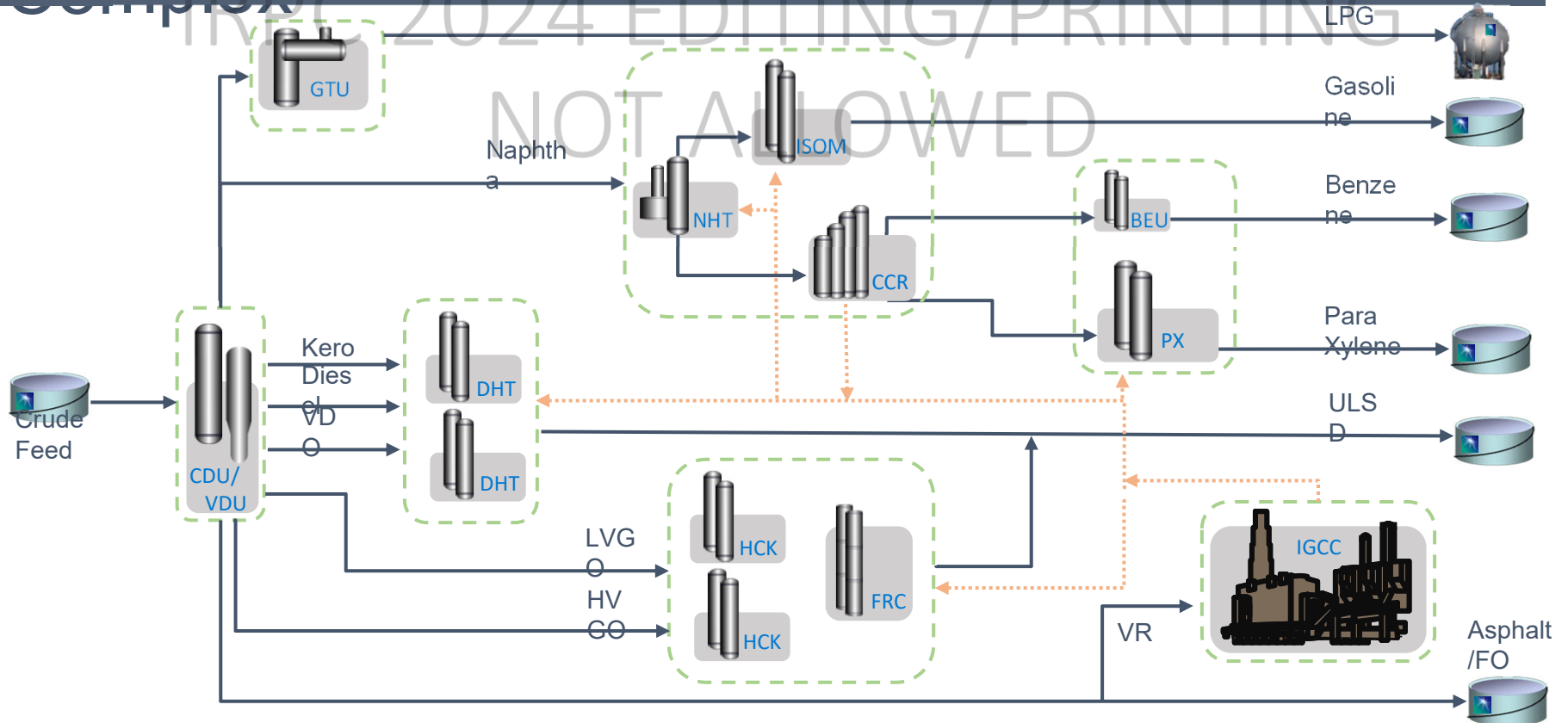


Facility Configuration



Saudi Aramco Jazan Refinery

Basic Refinery Configuration



Startup Limitations & Proposed Solution

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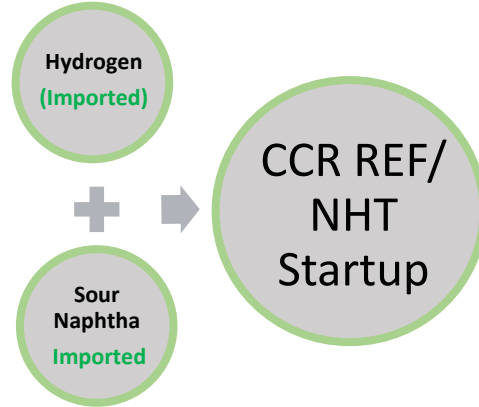
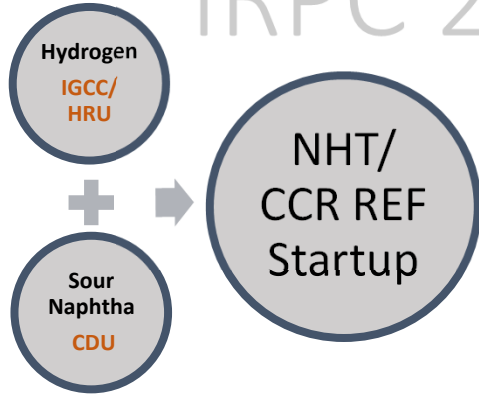
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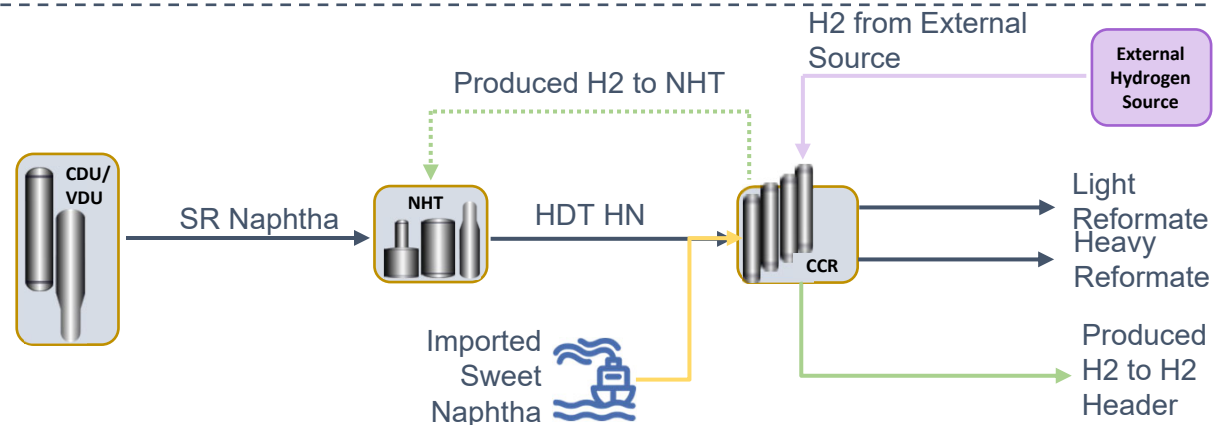
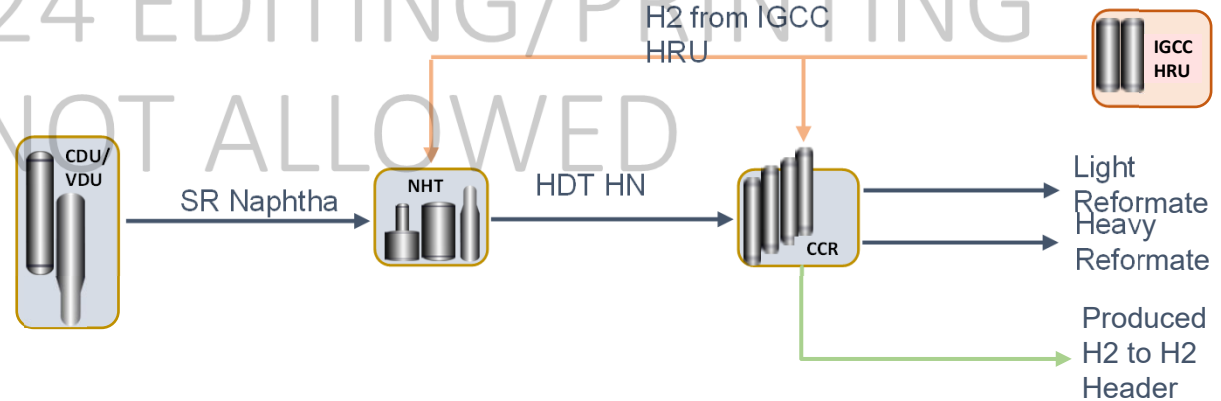


Startup Limitations Vs Proposed

Design Vs Proposed



Startup Schemes



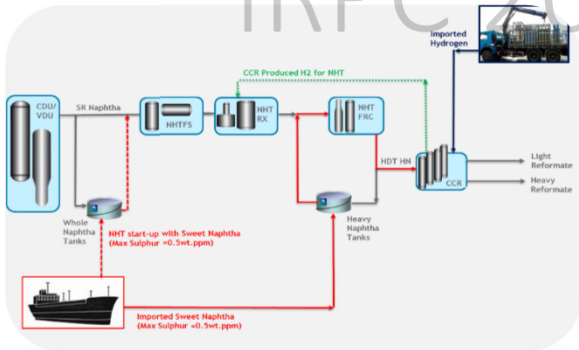
Approaches for Startup Option

03



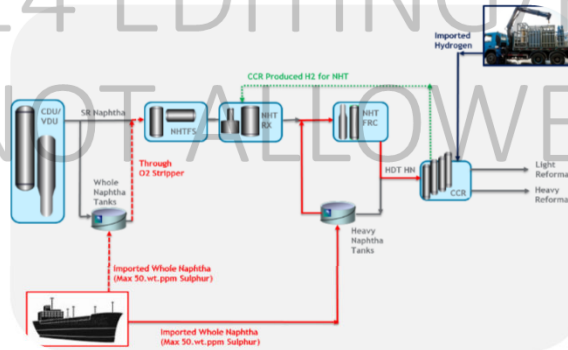
Approaches for Startup Options

Option # 01



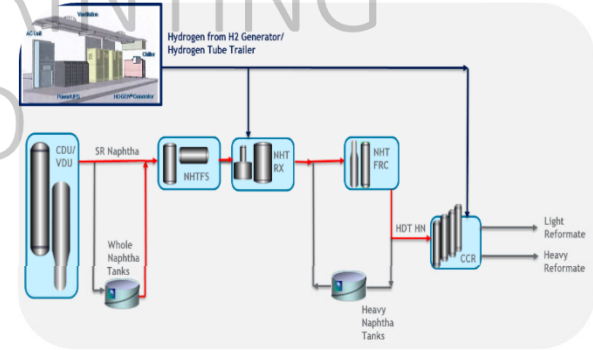
- 1 CCR Startup First (Imported HDT Naphtha)
- 2 NHT startup with Sweet feed
- 3 CCR Hydrogen Production
- 4 NHT Switching to Sour Feed

Option # 02



- 1 CCR Startup First (Imported Sour Naphtha)
- 2 NHT O2 Stripper Route
- 3 CCR Hydrogen Production
- 4 NHT Startup feed Switch

Option # 03



- 1 NHT Startup First (Hydrogen Generators)
- 2 Sweet Heavy Naphtha Feed Production
- 3 CCR Startup with Generator
- 4 CCR Hydrogen Production

Approaches for Startup Options

Basis of Decision

Major Challenges

1

- ✓ Sweet Naphtha Availability
- ✓ Naphtha Splitter Impacts



2

- ✓ Urgency to Start NHT
- ✓ Higher Coking Rate in CCR



3

- ✓ Reliability and Sustainability Issues
- ✓ Generator Capacity Issue
- ✓ Higher Cost & Time Delays



Major Benefits

1

- ✓ Easier to start NHT
- ✓ Time availability with CCR Operation



2

- ✓ Quality of CCR feed via O2 Stripper
- ✓ Sour naphtha Availability



3

- ✓ Normal Startup Scheme
- ✓ Ease in System Checks



Debottlenecking Selected Option

04



Debottlenecking Selected Option

Major Challenges



Availability of Imported Naphtha

Sweet Naphtha with (<0.5 wt. ppm S)



External Hydrogen Source

Tube Trailer with Pure Hydrogen

Planned Strategies

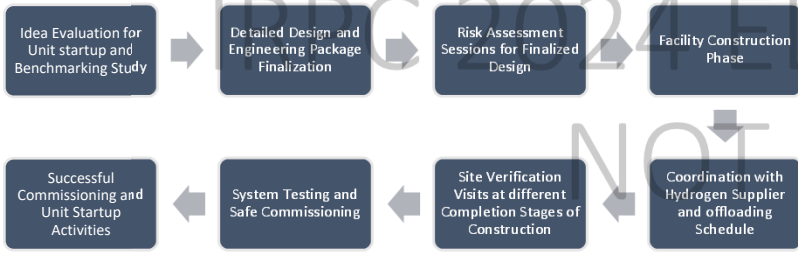
- Estimated Volumes for Heavy Naphtha.
 - Look for refineries, facing issues with reforming section or planning for reforming section shutdown.
 - Exploring availability from other Saudi Aramco or JV refineries.
 - Revised Product Movement Plan for terminal and tank farm.
-
- Estimate Volumes for Hydrogen.
 - Exploring hydrogen production facilities:
 - Trailers Capacity, Pressure & Availability.
 - Quality of Hydrogen.
 - Distance to refinery site.
 - Hydrogen Offloading (Continuous/ Intermittent)

Hydrogen Handling

05



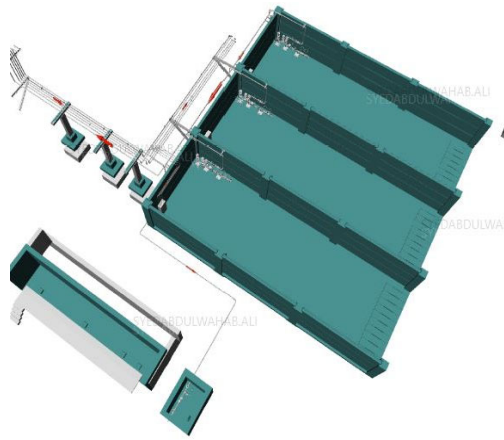
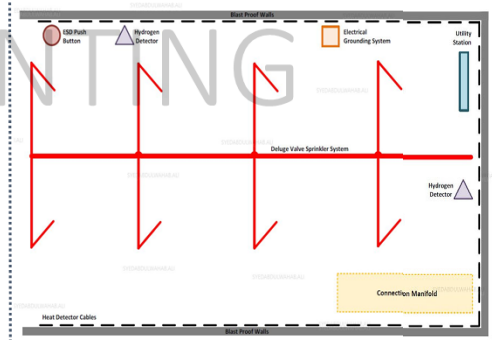
Hydrogen Offloading Timeline



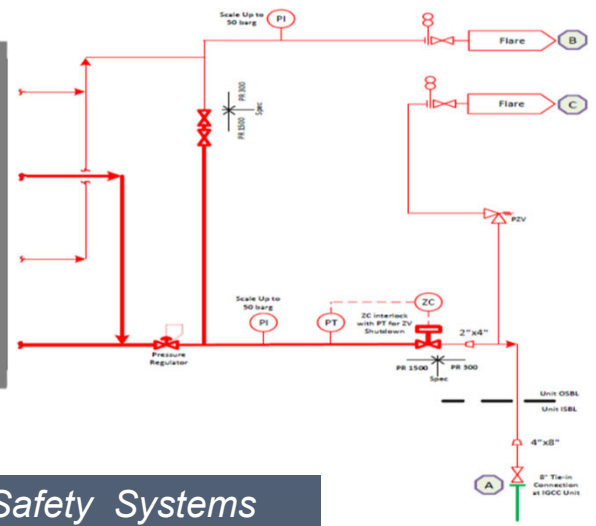
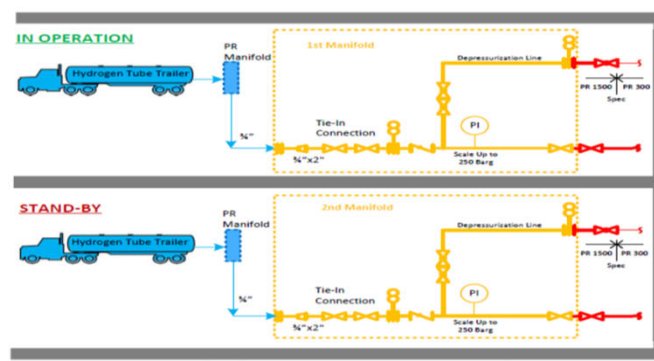
Vendor Tube Trailer



Fire Safety Elements



Blast Proof Walls



Process Safety Systems

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