

# Ma'aden Sulphuric Acid Plant Project

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Dr. Peter Weber

President, Metals Processing Division

**Outotec**

More out of ore



# 1. Basics

## 2. Project Overview

## 3. Project Development

## 4. Project Execution

## 5. Services





# 1. Basics

## 2. Project Overview

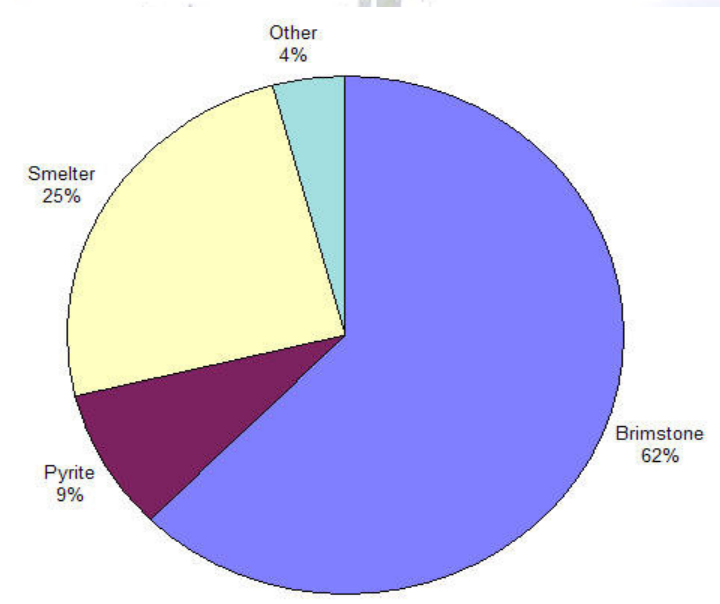
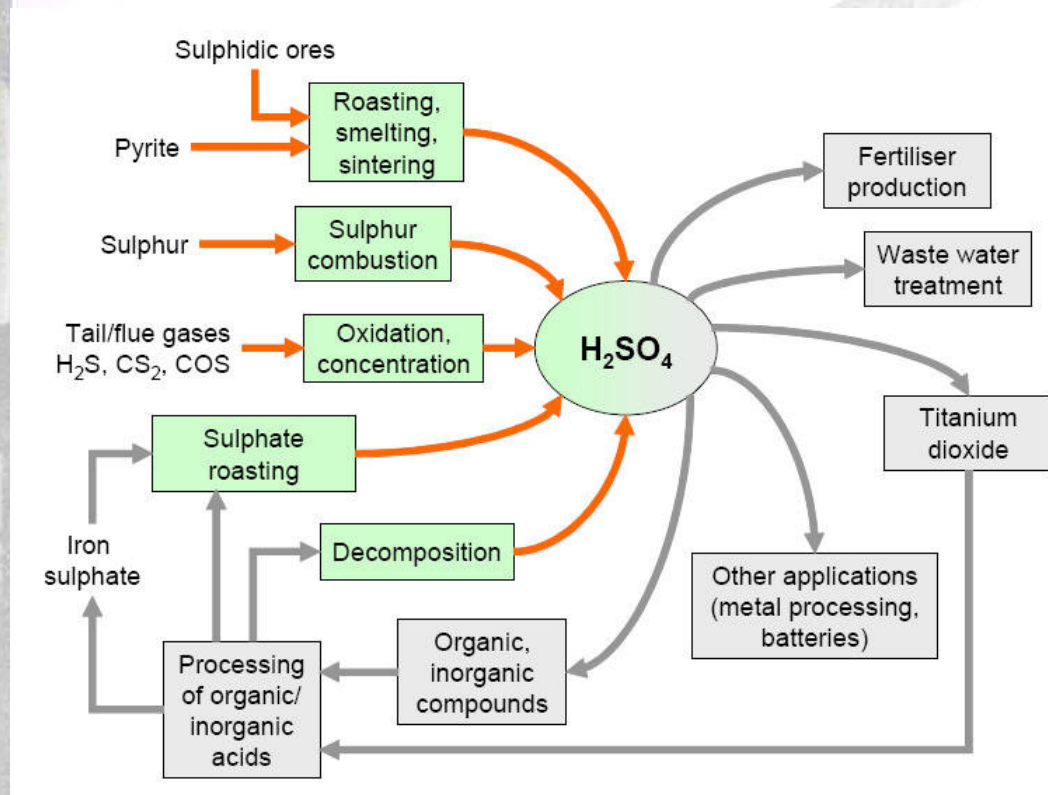
## 3. Project Development

## 4. Project Execution

## 5. Services



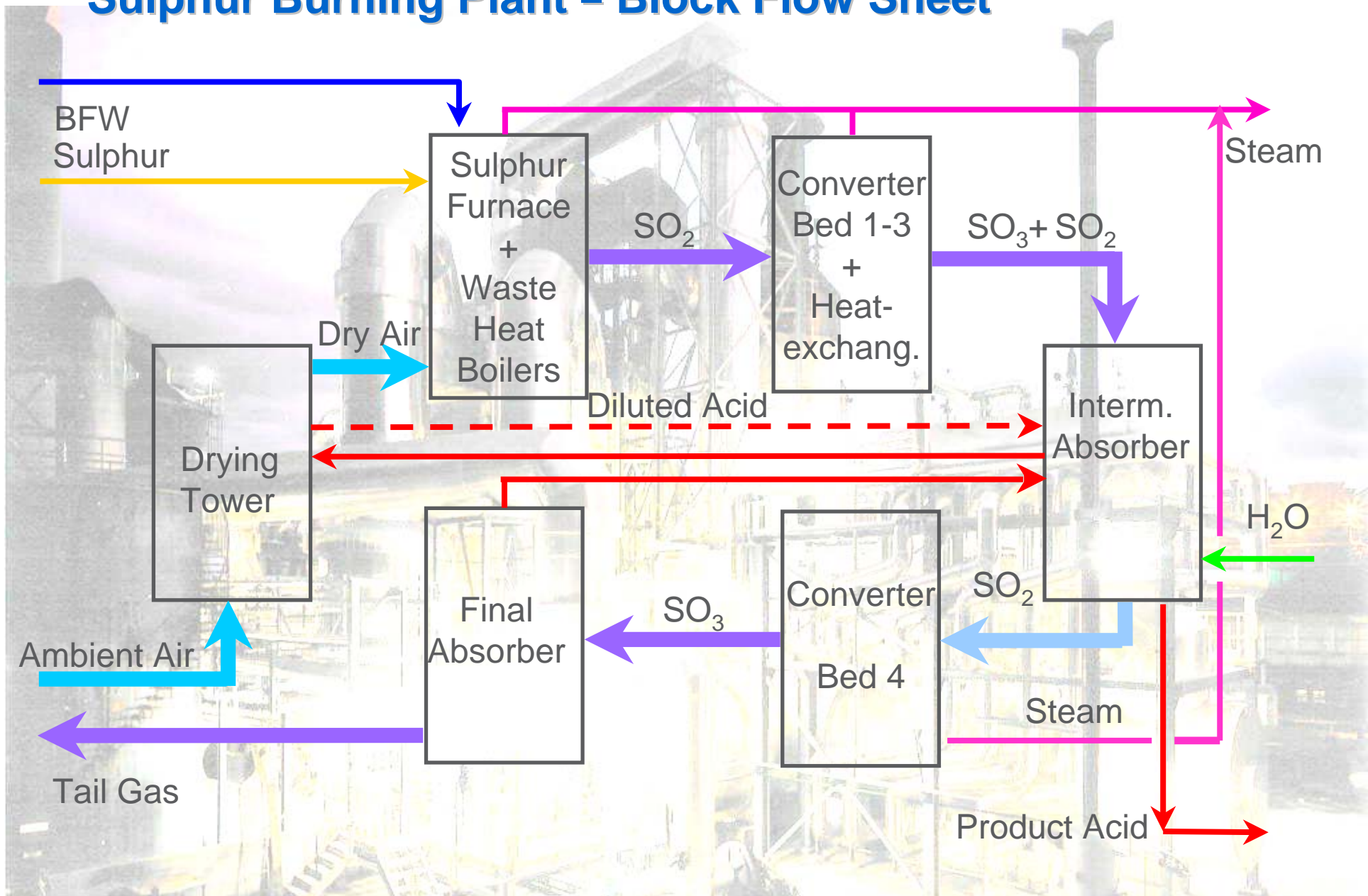
# Basics – Sources and Use of Sulphuric Acid



Total 200 million t  $H_2SO_4$



## Sulphur Burning Plant – Block Flow Sheet



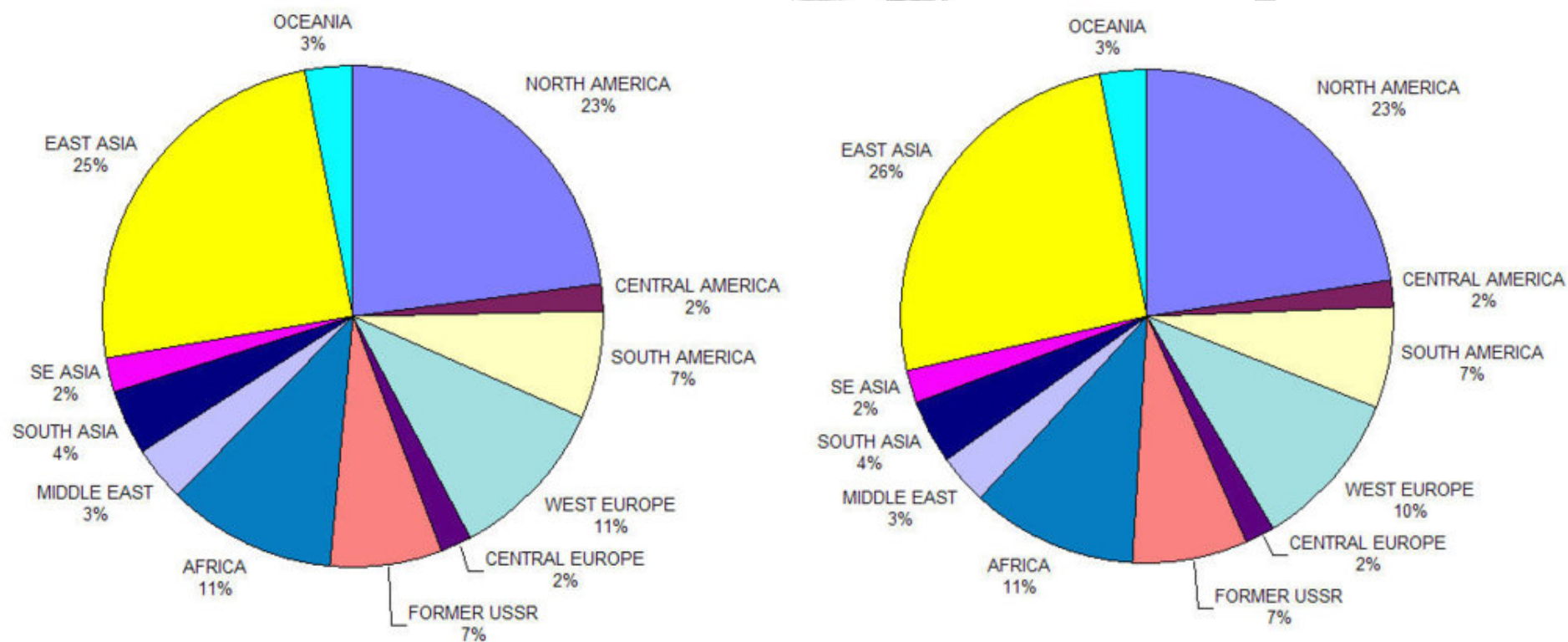
## World Sulphuric Acid Production and Consumption - 2007



Production



Consumption




Total 200 million t  $H_2SO_4$



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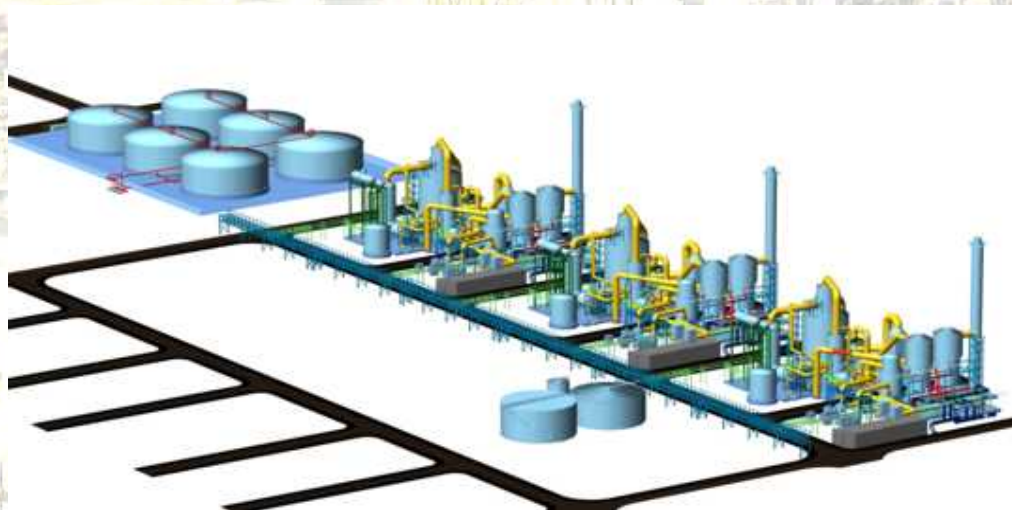
5. Services



# Project Overview – Key Figures

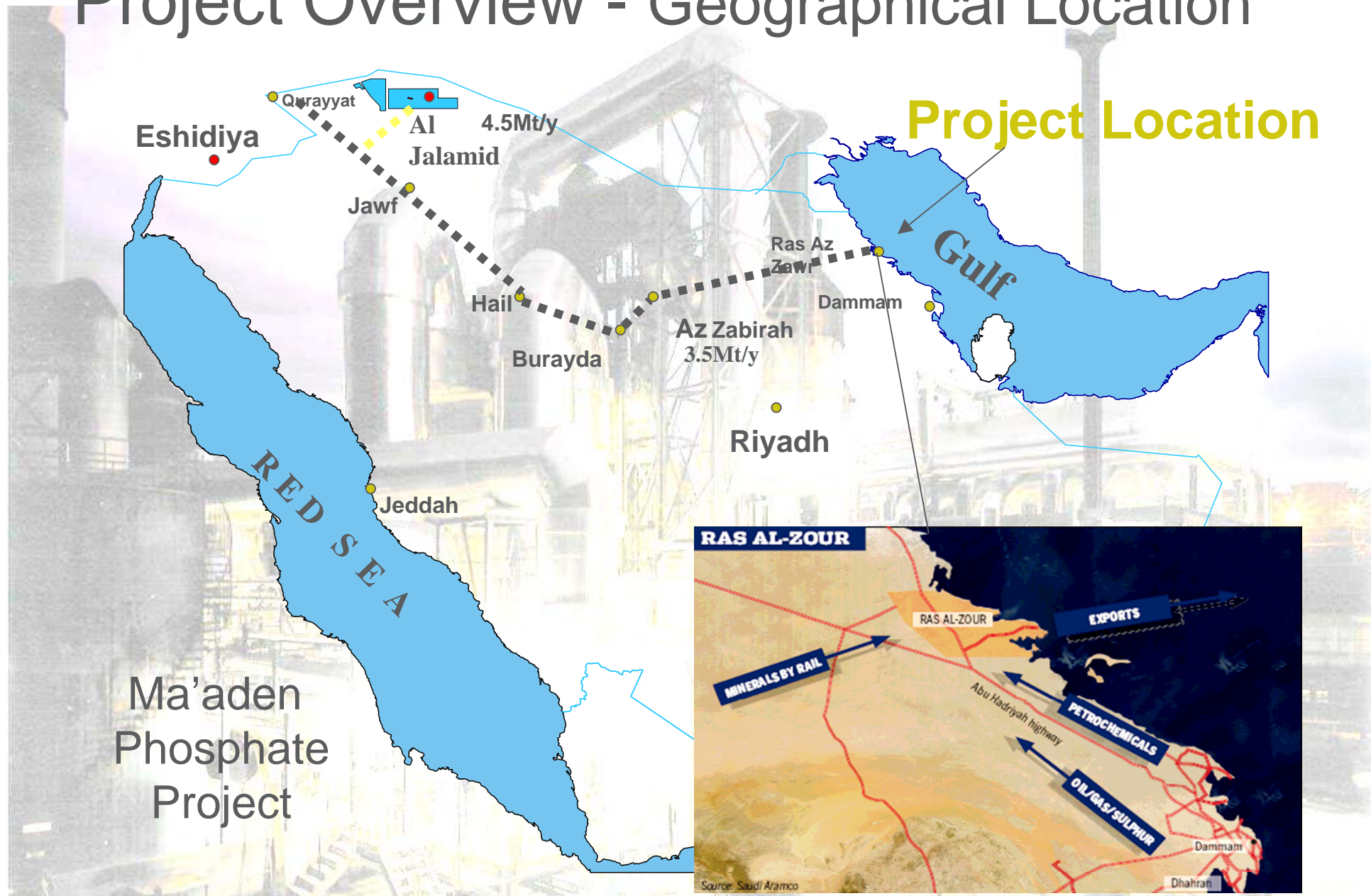
<b>Total Ma'aden Investment for Fertilizer Complex</b>	USD 5,52 billions*
<b>Total Cost Sulphuric Acid Plants</b>	USD 495 M**
<b>Outotec Import Contract</b>	EUR 270**

\* Source Maaden Press Release: June 2008; \*\* Contracts June 2007





# Project Overview - Geographical Location



Ma'aden  
Phosphate  
Project

**Project Location**

Gulf

RED SEA

**RAS AL-ZOUR**

RAS AL-ZOUR

EXPORTS

MINERALS BY RAIL

PETROCHEMICALS

OIL/GAS/SULPHUR

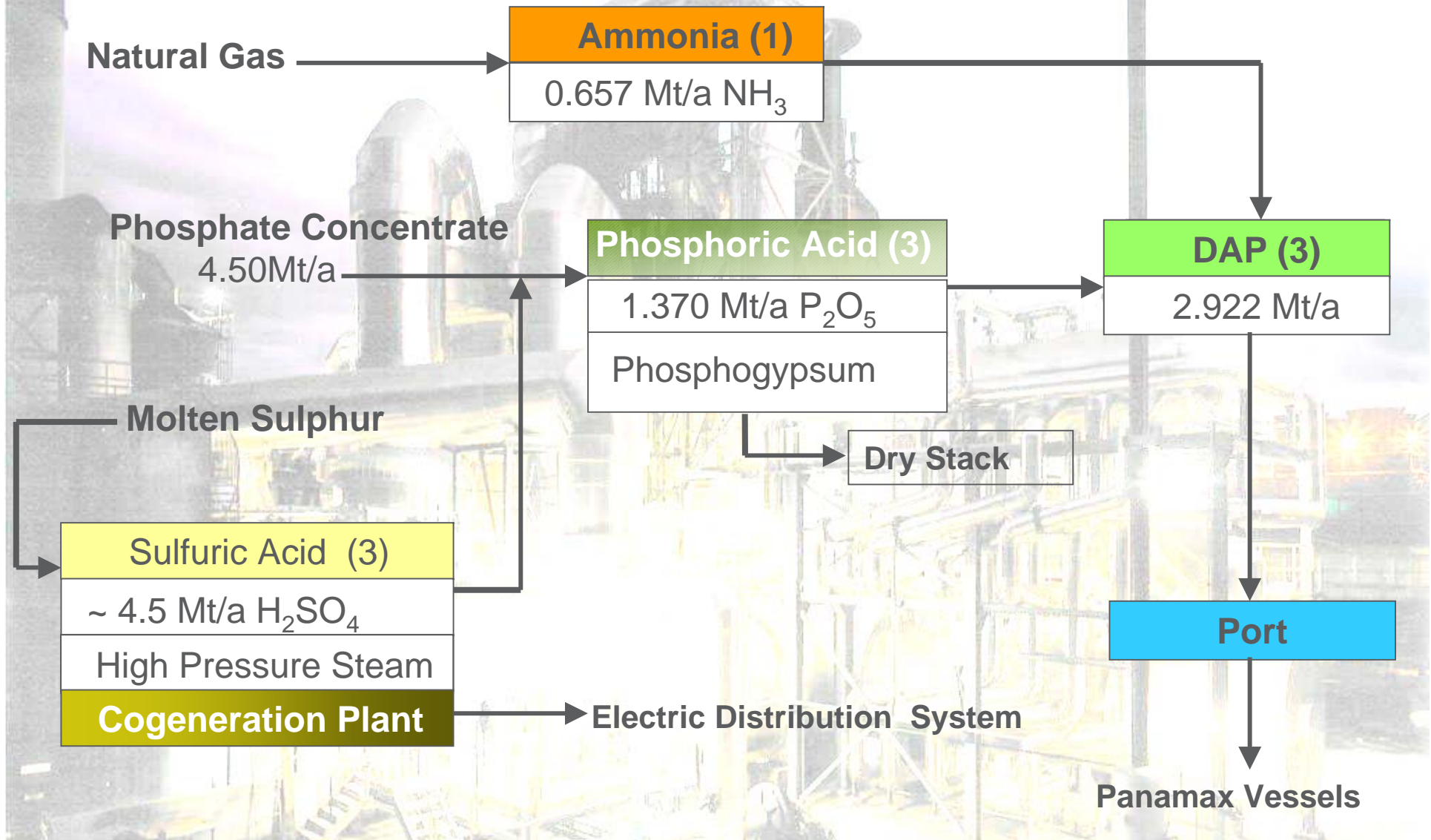
Abu Hadryah highway

Dammam

Dhahran

Source: Saudi Aramco

# Project Overview – Fertilizer Complex





**DEMIN AREA**



**CONVERTER AREA - PLANTA**



**PLANT A**



**NORTH VIEW**

# **MA'ADEN SAP PROJECT**



# Converter A progress



# View from Plant A to Plant B/C





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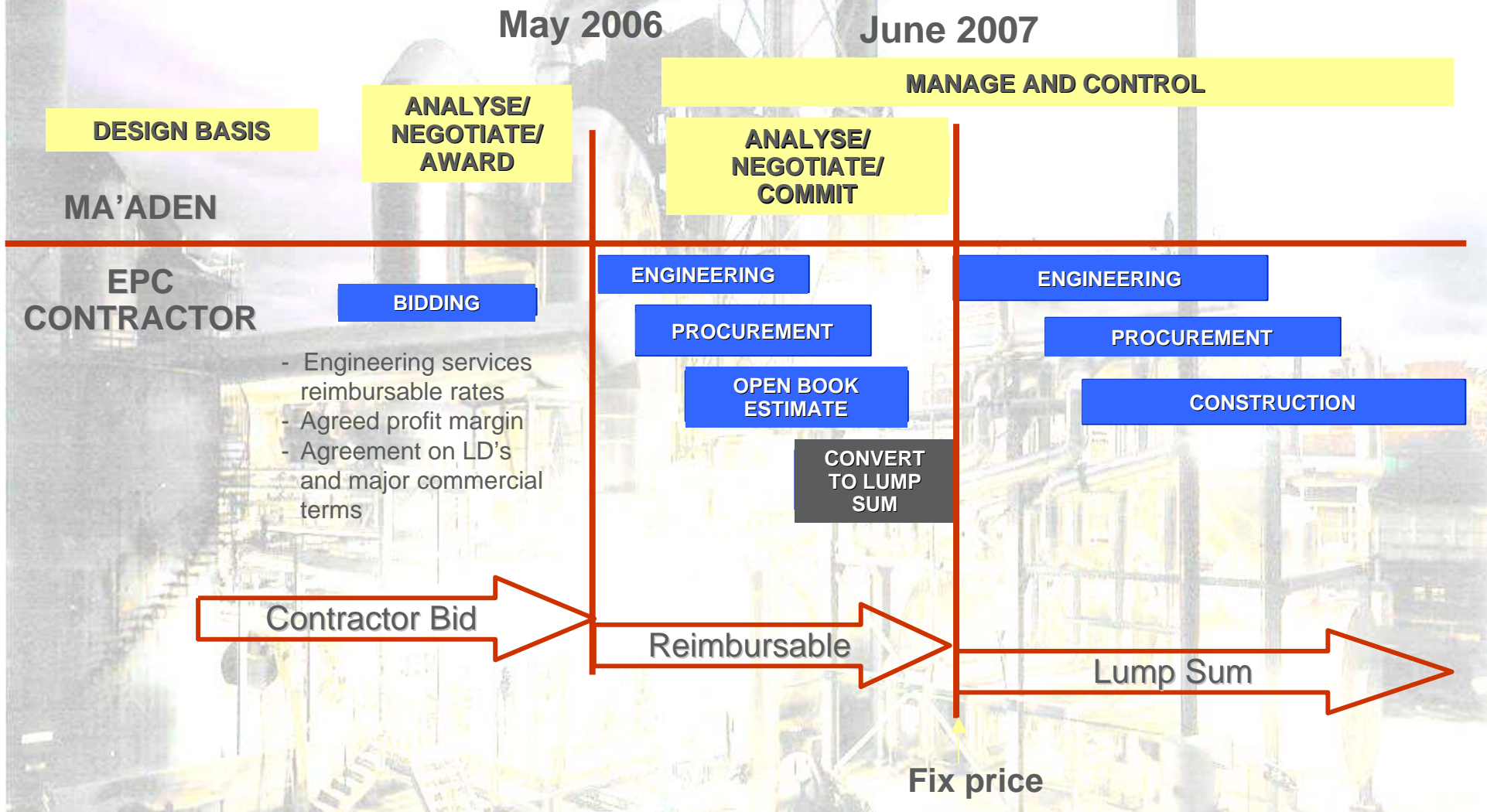
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# Project Development – Convertible EPC approach





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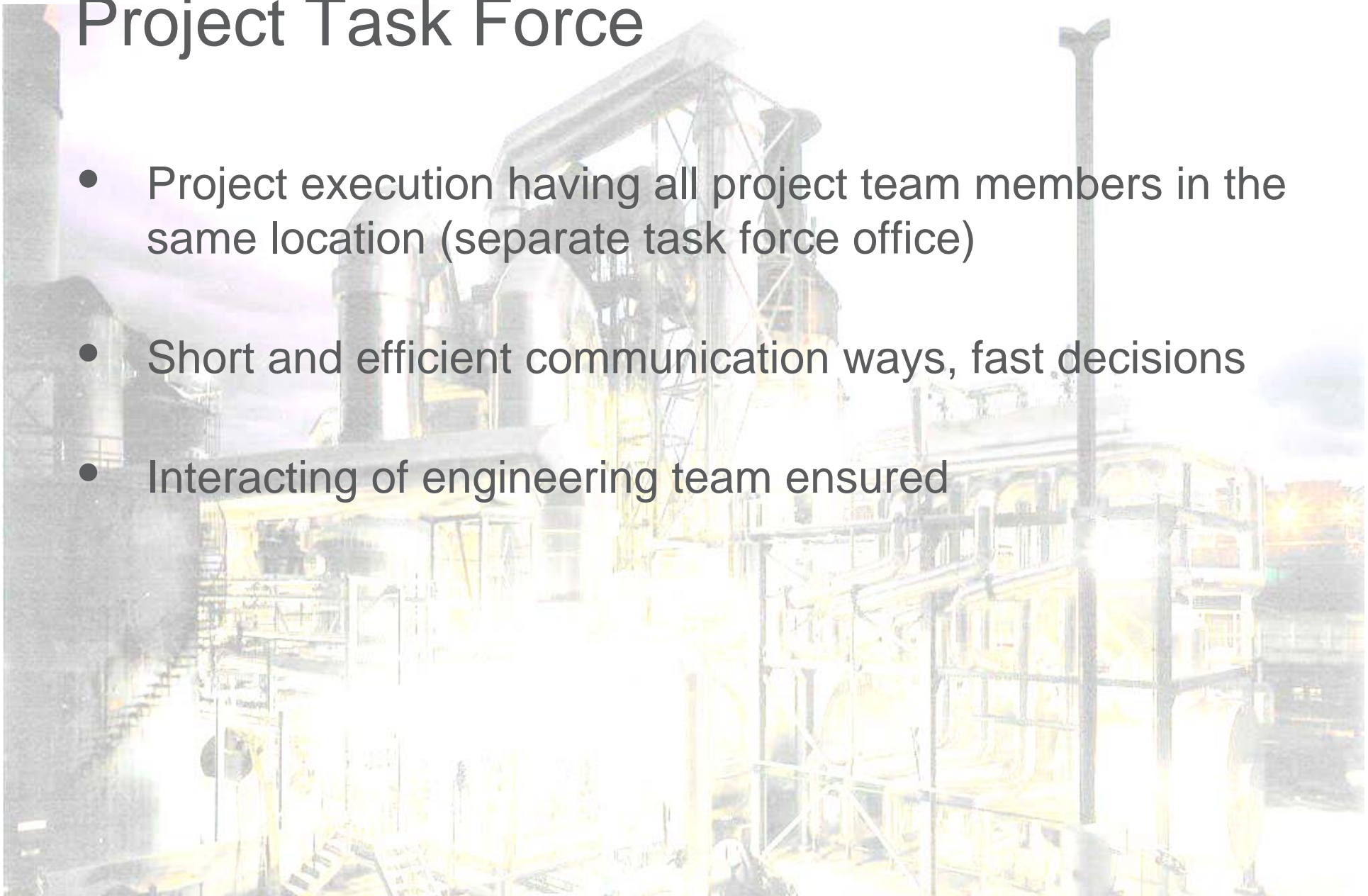


# Scope of Services and Supplies

- **Outotec's scope:**  
Design, engineering, delivery and Commissioning on a Lump-Sum-Turnkey basis
- **GAMA Arabia's scope:**  
Local supplies and Construction
- Some key data:
  - Project implementation schedule: 31 month to MC
  - Total tons of structural steel: 3.800 metric tonnes
  - Total tons of equipment: 25.000 metric tonnes
  - Total cubic meters concrete: 23.000m<sup>3</sup>
  - Total electrical drives installed: 200
  - Total cables installed: 350 km
  - Total construction hours: 3.750.000

# Project Task Force

- Project execution having all project team members in the same location (separate task force office)
- Short and efficient communication ways, fast decisions
- Interacting of engineering team ensured



# Global Sourcing

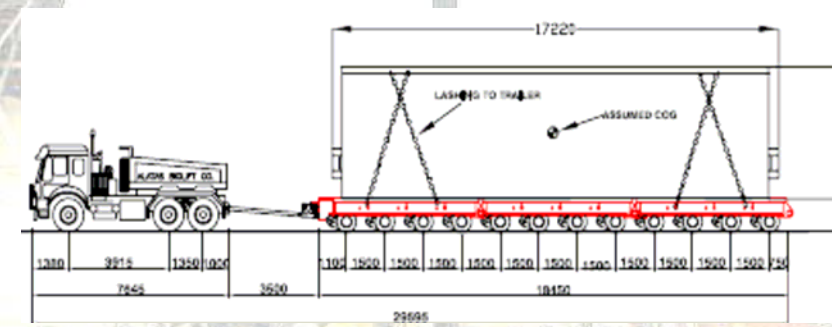
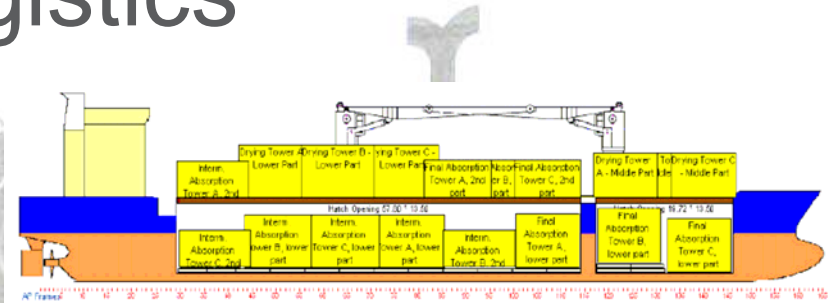
Supplies from and Fabrication in

- Europe
- Asia (South Korea, Taiwan, China)
- North America (Canada)
- South America (Argentina, Brazil)



# Managing Complex Logistics

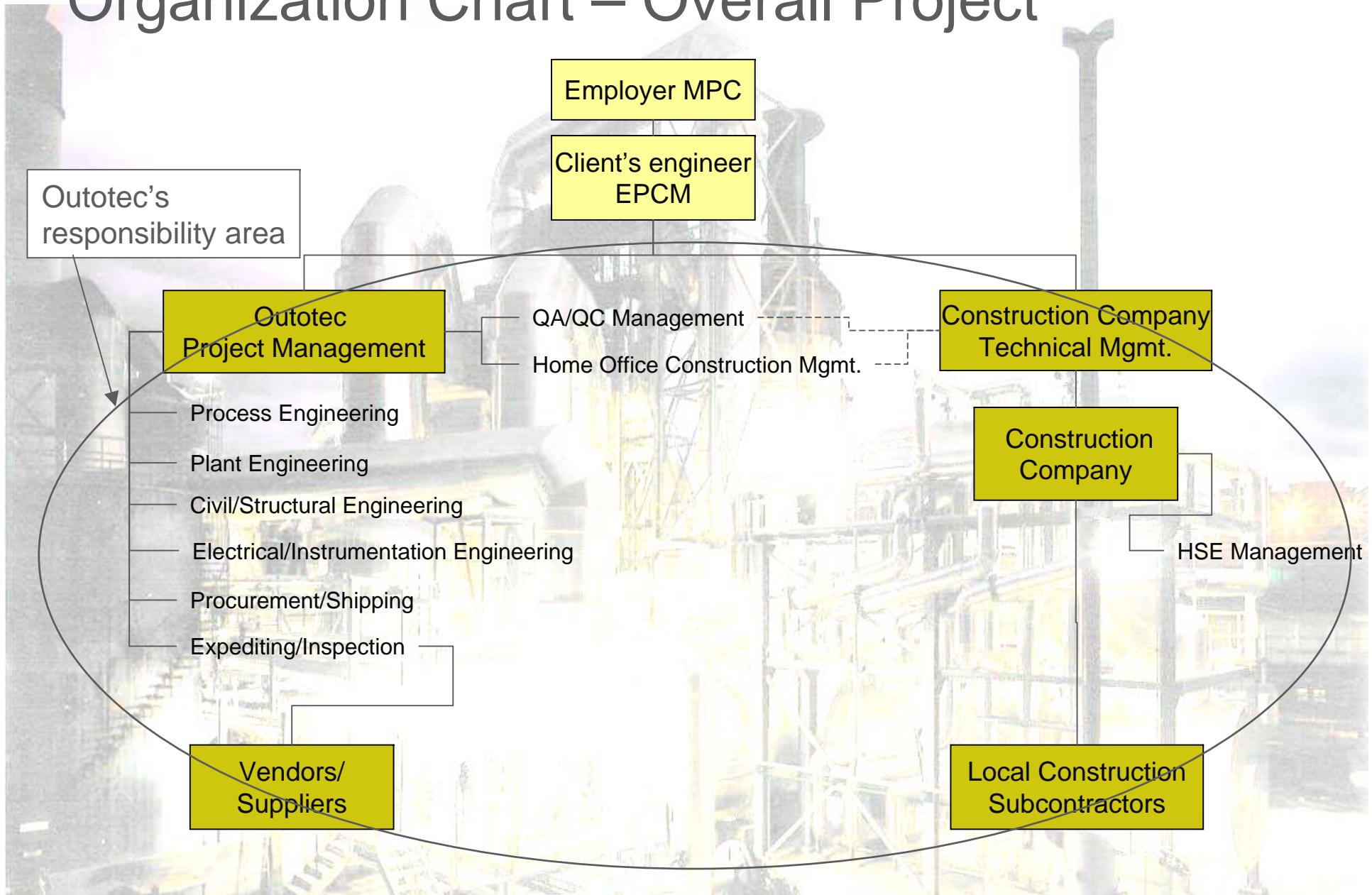
- Approx. 120 shipments
- Approx. 140.000 freight tons (100.000 frt break bulk 40.000 frt container shipment)
- Heavy items up to 290 tons
- Shipments from Europe, Asia and America



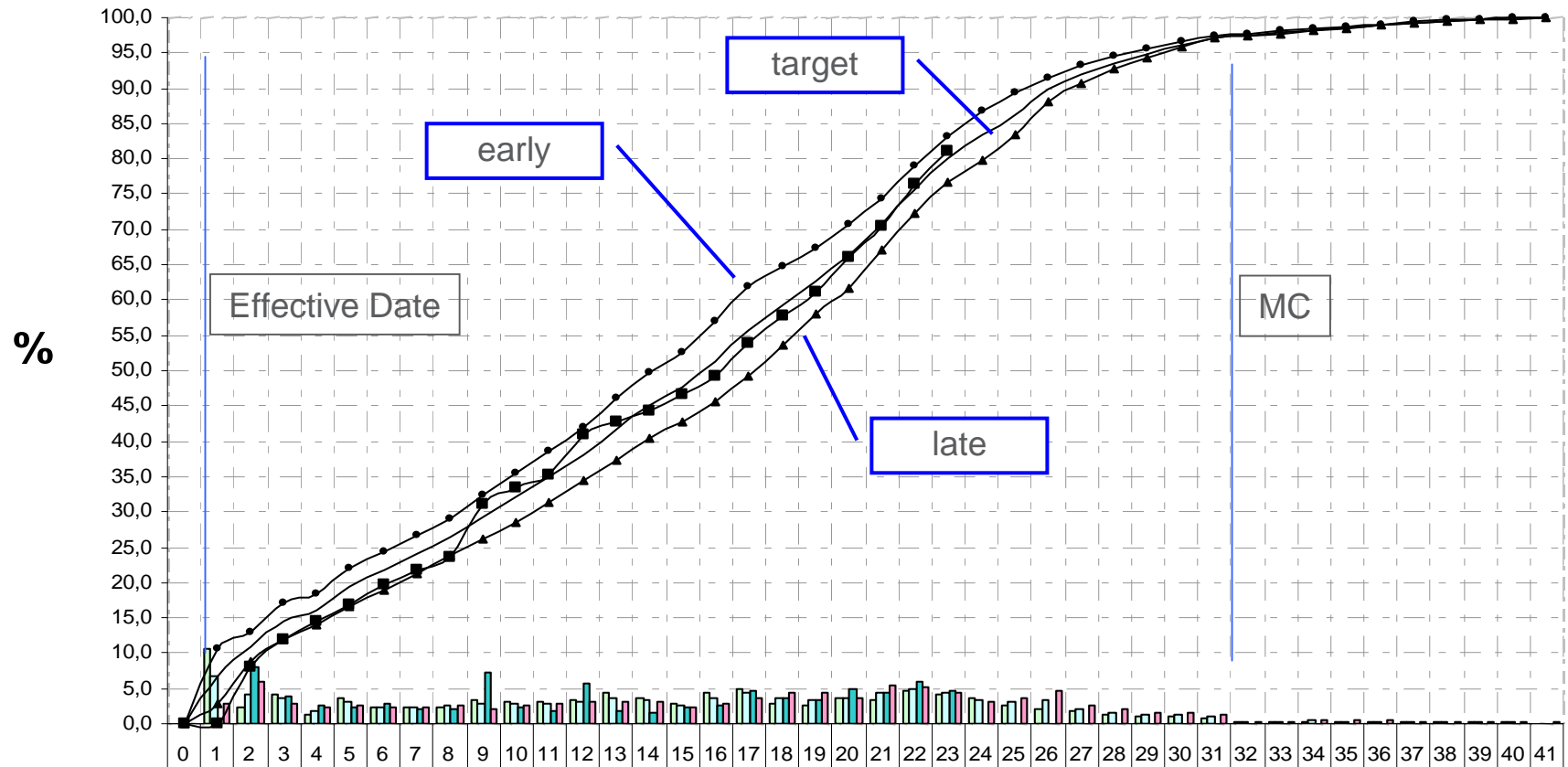
# Manpower

- Engineering Home Office Oberursel up to 40
- Worldwide Expediting (Outotec) up to 5
- Construction Site Raz Az Zawr / KSA (GAMA)
  - Technical Management Team up to 35
  - Suppliers supervision up to 20
  - Construction Indirects up to 140
  - Construction Direct Manpower up to 1,200
- Commissioning up to 10
- **Total up to 1,450**

# Organization Chart – Overall Project



# Progress Curve - Total Project



Early / Month	0	10	2,3	4,1	1,3	3,7	2,4	2,4	2,4	3,3	3,2	3,1	3,3	4,3	3,5	2,9	4,5	4,8	2,9	2,5	3,5	3,4	4,6	4,3	3,6	2,6	2,1	1,8	1,3	1,1	1,0	0,8	0,4	0,3	0,4	0,3	0,3	0,3	0,1	0,1	0,0				
Target / Month	0	6,7	4,2	3,5	1,8	3,2	2,4	2,3	2,5	2,7	2,8	3,0	3,1	3,7	3,3	2,5	3,7	4,3	3,6	3,4	3,5	4,5	5,0	4,3	3,3	4,3	3,1	3,4	2,2	1,6	1,3	1,3	1,0	0,3	0,3	0,4	0,4	0,3	0,3	0,3	0,1	0,1	0,0		
Actual / Month	0	0,0	8,0	3,9	2,5	2,3	2,9	2,0	2,0	7,3	2,4	1,8	5,7	1,7	1,6	2,3	2,7	4,7	3,7	3,4	5,0	4,3	6,0	4,6																					
Late / Month	0	2,9	6,0	2,9	2,2	2,6	2,3	2,2	2,6	2,2	2,5	2,9	3,0	3,0	3,1	2,2	2,8	3,7	4,3	4,4	3,5	5,5	5,3	4,4	3,1	3,5	4,8	2,6	2,0	1,5	1,5	1,3	0,3	0,3	0,4	0,4	0,4	0,3	0,3	0,1	0,1	0,1			
Early cum.	0	10	12	17	18	22	24	26	29	32	35	38	41	46	49	52	57	61	64	67	70	74	78	83	86	89	91	93	94	95	96	97	97	97	98	98	98	98	99	99	99	99	10		
Target cum.	0	6,7	10	14	16	19	21	24	26	29	32	35	38	41	45	47	51	55	59	62	66	70	75	80	83	86	89	92	93	94	96	97	97	97	97	98	98	98	99	99	99	99	10		
Actual cum.	0	0,0	8,0	11	14	16	19	21	23	31	33	35	40	42	44	46	49	53	57	61	66	70	76	81																					
Late cum.	0	2,9	8,9	11	14	16	19	21	23	26	28	31	34	37	40	42	45	49	53	58	61	67	72	76	79	83	88	90	92	94	95	97	97	97	97	98	98	98	99	99	99	99	10		

# Risks and Risk Mitigation

- **Quality** ➤ **Supplier qualification procedure/ Intensive expediting/permanent fabrication supervision in suppliers workshops for critical items**
- **Completion Schedule** ➤ **Intensive suppliers' expediting and reporting, permanent analysis of actual vs. target progress by engineering discipline and for construction**
- **Procurement/material cost** ➤ **Global sourcing and strict bid comparison/analysis**
- **Currency exchange rate** ➤ **Precise cash planning and forward hedging contracts**
- **Country specific risks** ➤ **Political risk insurance**
- **Technological risks** ➤ **Largest plant ever built, but manageable upscale factor**





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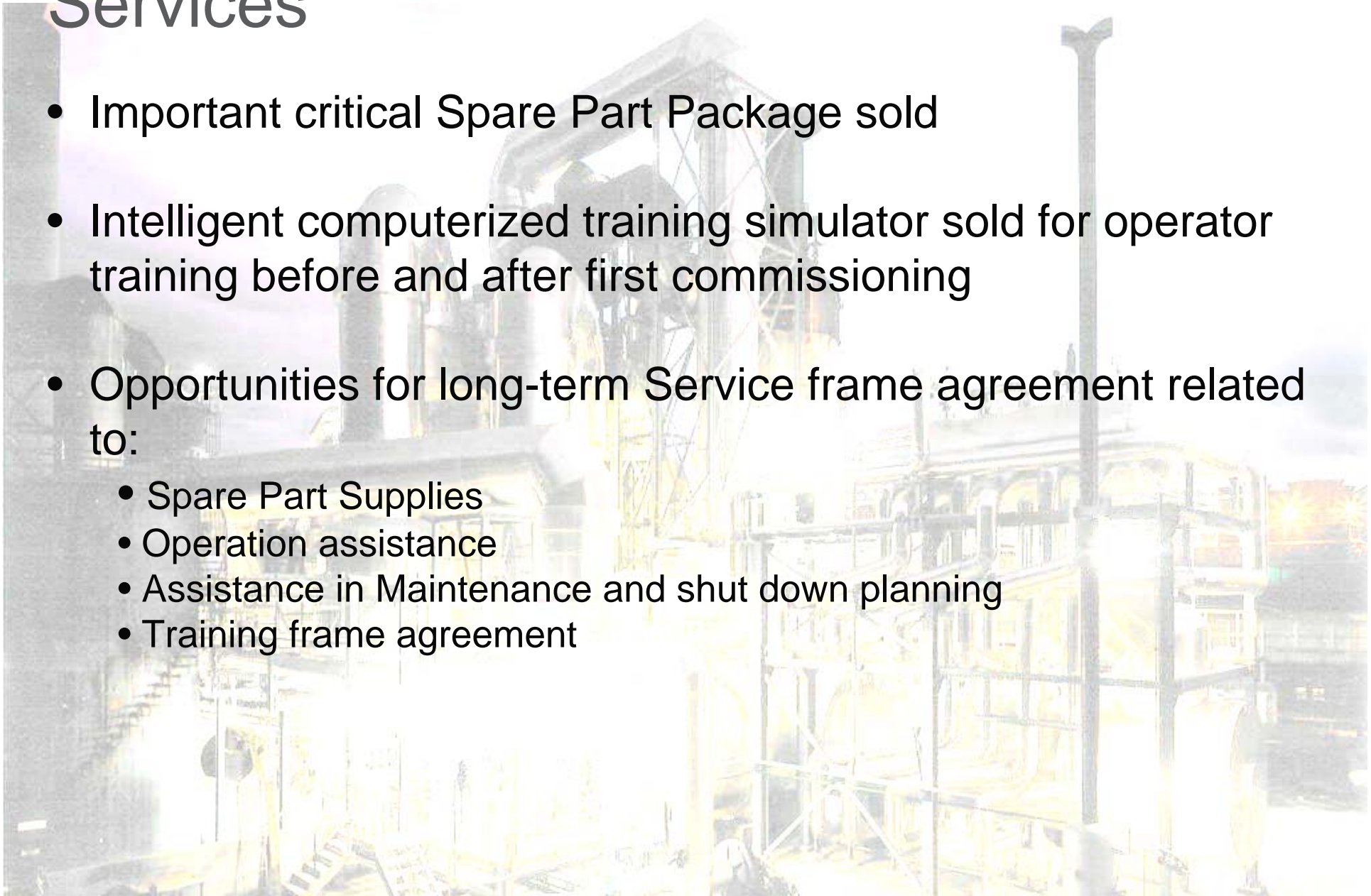
4. Project Execution

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# Services

- Important critical Spare Part Package sold
- Intelligent computerized training simulator sold for operator training before and after first commissioning
- Opportunities for long-term Service frame agreement related to:
  - Spare Part Supplies
  - Operation assistance
  - Assistance in Maintenance and shut down planning
  - Training frame agreement



# Overall View Construction Site





Grinding mill at Kittilä gold mine in Finland

Q&A  
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