

# Oil and Gas Upstream Cost Estimation in National Iranian Oil Company

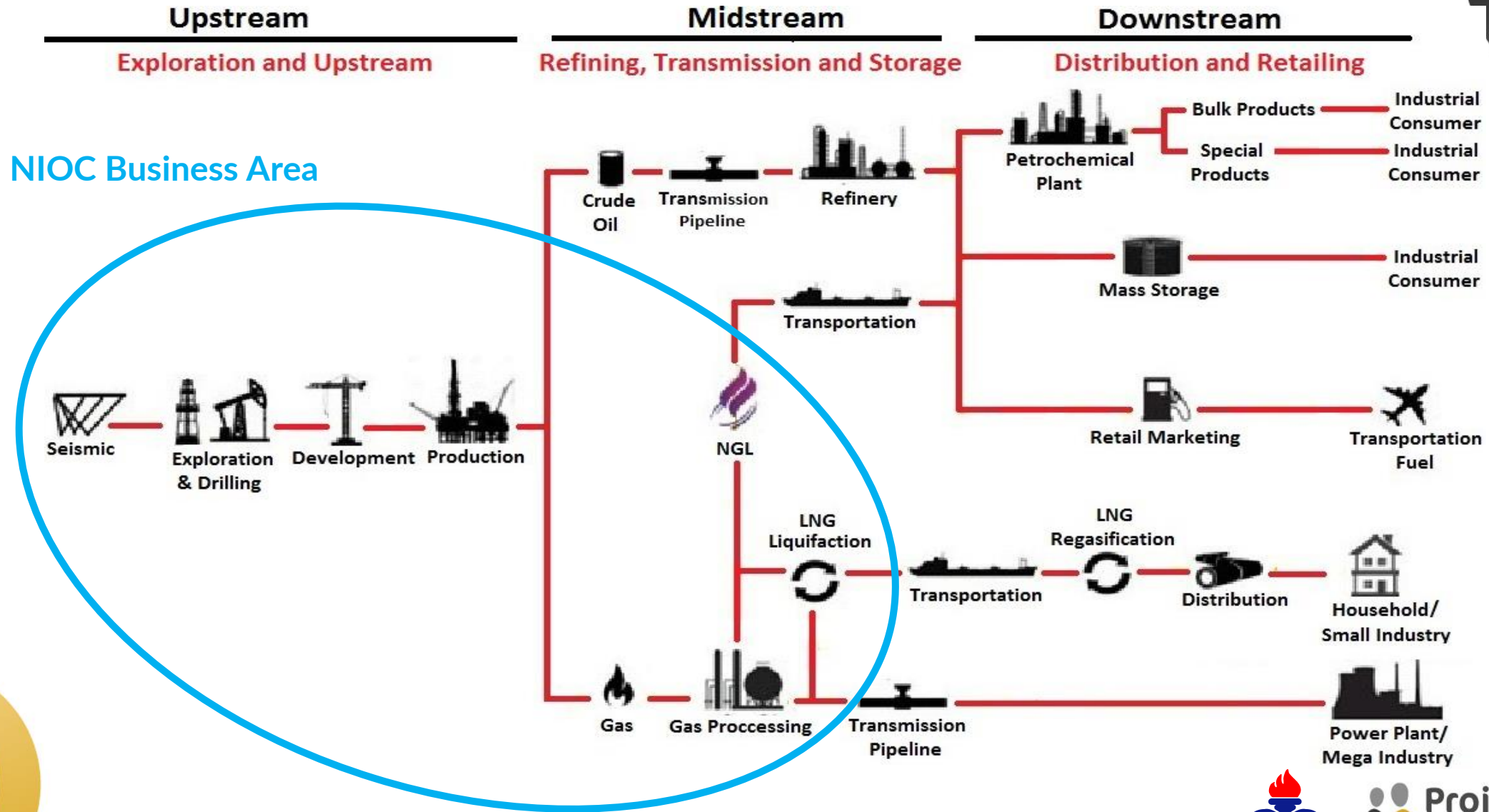
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# Contents

- The Oil and Gas Industry at a Glance
- Upstream Programs and Projects in NIOC
- The Project Lifecycle and Estimating
- Different Types of Estimation
- Estimation Strategy and Methodology
- The Cost Estimation Tools
- Cost Estimation Methodology in Guidelines
- Drilling Oil and Gas Wells Cost Estimation Methodology
- The Development History of Drilling Oil and Gas Wells Guideline

# The Oil and Gas Industry at a Glance



# Upstream Programs and Projects in NIOC



Drilling Oil and Gas Wells



Crude Oil Processing and Desalination Units



Oil Pump Station & Gas Pressure Boosting Stations



Oil and Gas Pipelines



Hydrocarbon Storage Tanks



Gas Refineries and LNG Units



Offshore Oil & Gas Platforms

## Infrastructure Projects:



Power Plants, Power Transmission Lines and Substations



Roads and Building Construction

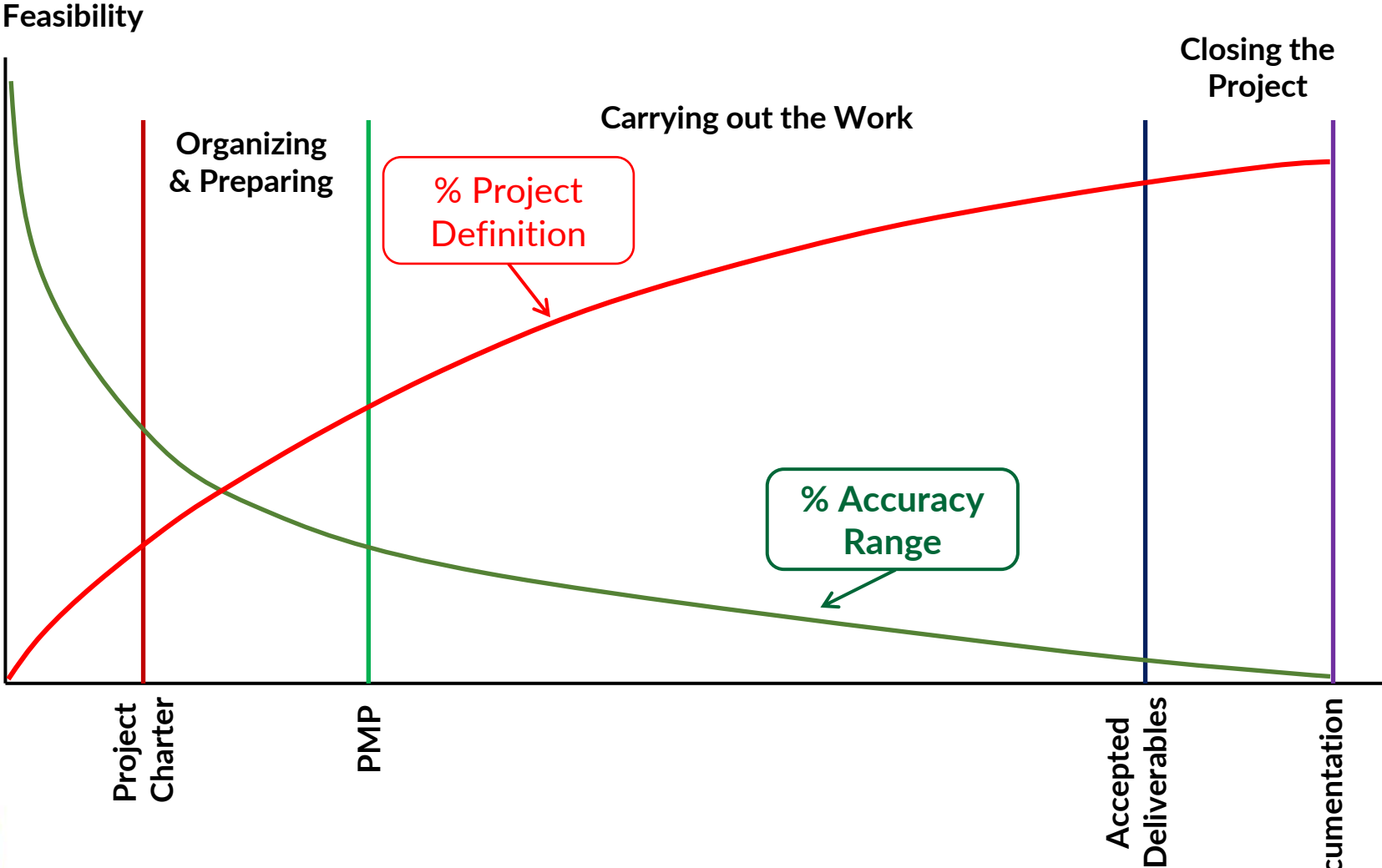
## Other:

Revamping and Overhaul


Energy Efficiency Improvement Projects



# The Project Lifecycle and Estimating



# Different Types of Estimation



AACE Classification Standard	ANSI Z94.0 (PMBOK)	UK Ass. Of Cost Engineering	Some Major Companies
Class 5	Order of Magnitude Estimate	Order of Magnitude Estimate Class 4	Strategic Estimate
Class 4	Budget Estimate	Study Estimate Class 3	Conceptual Estimate
Class 3		Budget Estimate Class 2	Semi-Detailed Estimate
Class 2	Definitive Estimate	Definitive Estimate Class 1	Detailed Estimate
Class 1			

# Different Types of Estimation

	Primary Characteristic	Secondary Characteristic		
Estimate Class	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of Estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges
Class 5	0% to 2%	Conceptual Planning	Capacity factored, Parametric models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Screening Options	Equipment factored or Parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Funding Authorization	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Project Control	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid / tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Best Estimation Strategy



# Estimation Strategy and Methodology

- Estimation Strategy

Top-Down → (Fast, Not Expensive)

- Methodology

- Analogous → (NGL: ?\$, Power plant: ?\$)

- Parametric → (Storage Tanks cost/ Barrel, Pipelines/ Dia. inches/km)

- Heuristic → (Engineering: ?%, Construction: ?%)



Expert Judgment

Historical Data Analysis



# The Cost Estimation Tools

- **Softwares**

Que\$TOR

ASPEN

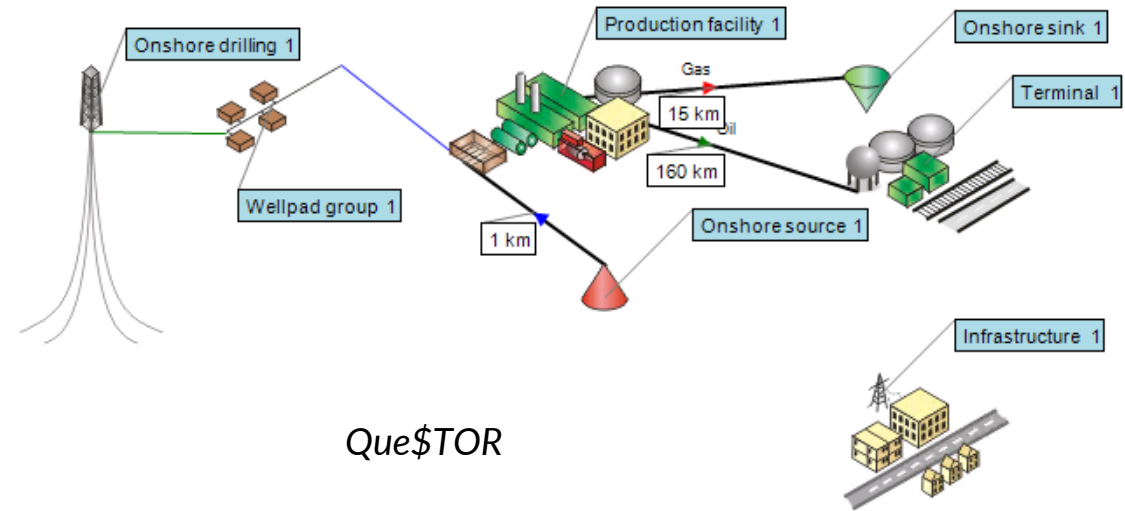
NetCo\$ter

CostOS

**Constraints:**

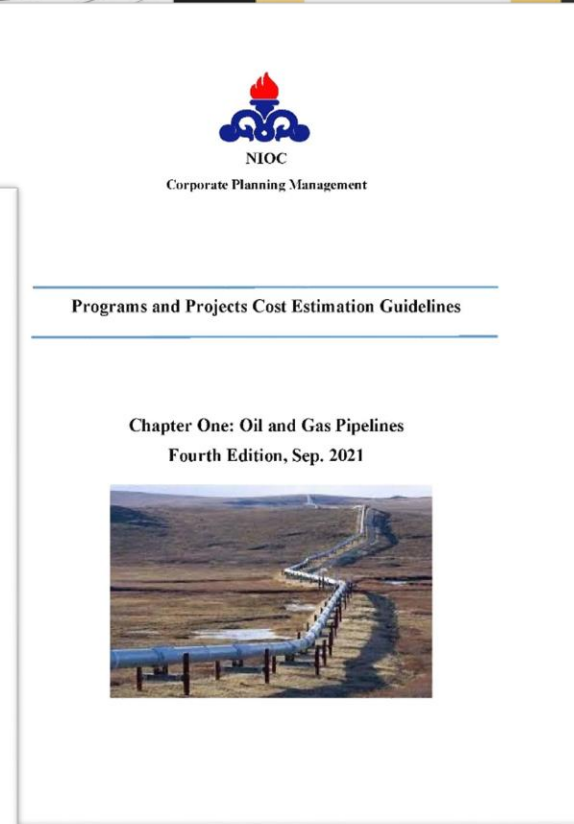
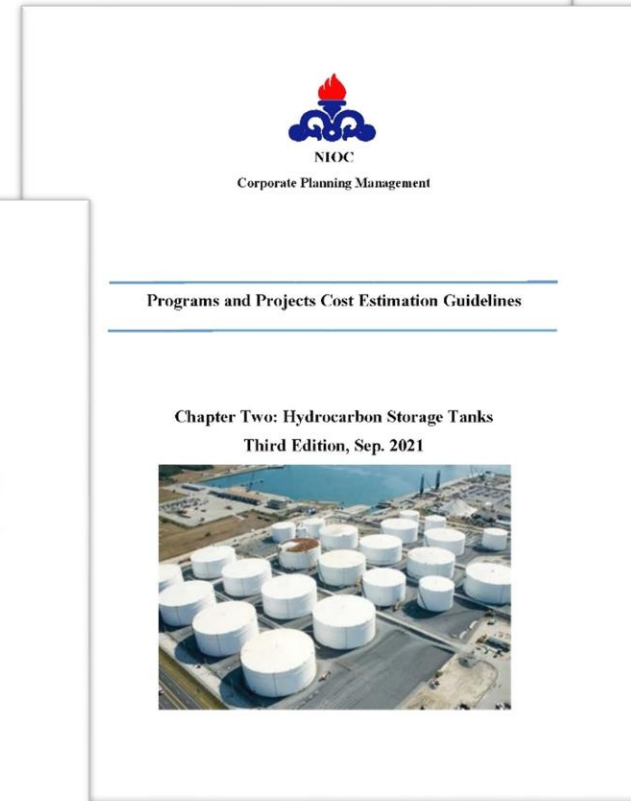
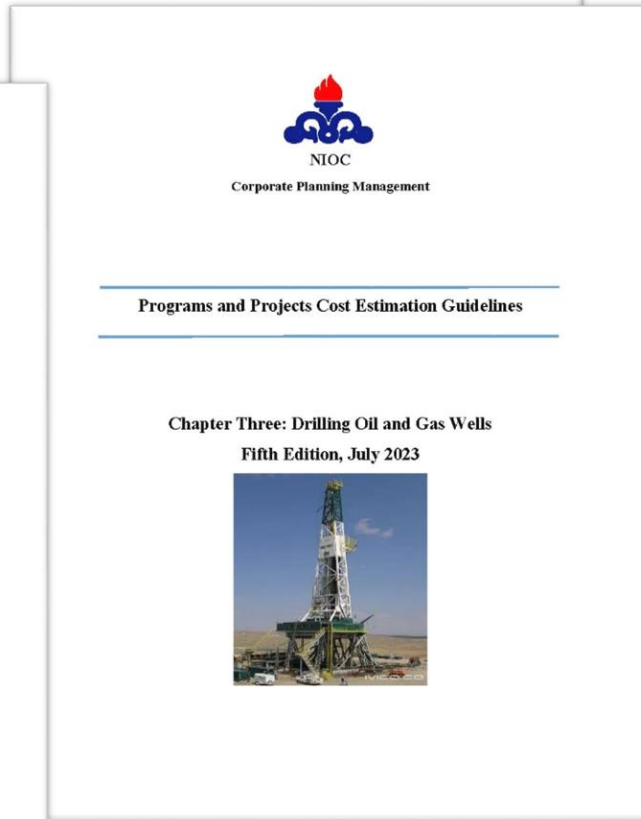
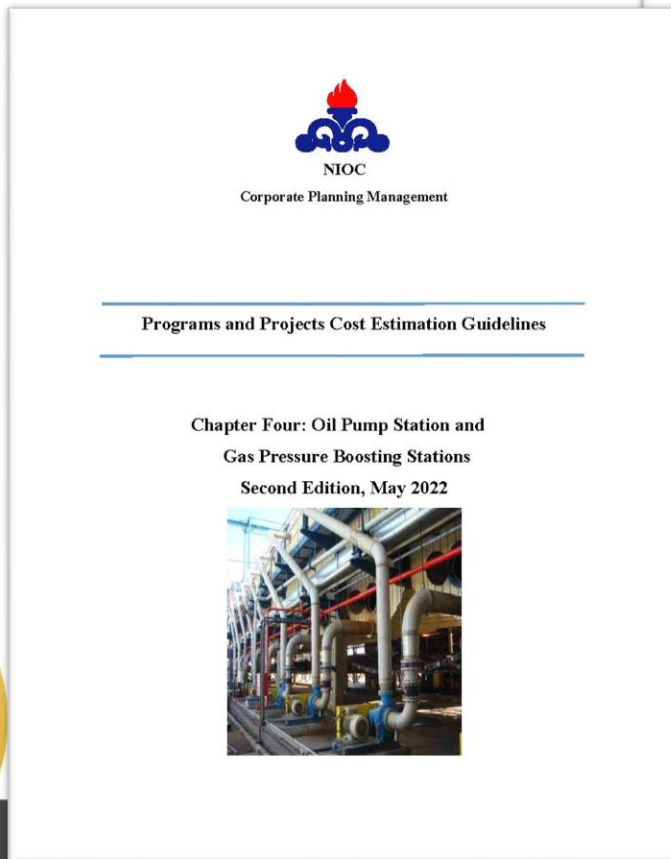
not Based on NIOC's Historical Data

Manpower rate and Material Cost are Region-Based



# The Cost Estimation Tools

- In-house Guidelines
  - Company's Internal Demands
  - Local and Environmental Conditions



# Cost Estimation Methodology in Guidelines

- Finding the Cost Drive of the projects, **Examples:**
  - Pipe Price (\$/Kg) in Oil and Gas pipeline Guideline
  - Plate Price (\$/Kg) in Hydrocarbon Storage Tanks Guideline
  - Rotary Equipment (\$/hp) in Oil Pump Station and Gas Pressure Boosting Stations Guideline etc
- Calculating the Other costs as the Percentage of the Main Cost Drive



**More Than  
60 Sessions**

**Team Building  
(NIOC Experts)**

# Drilling Oil and Gas Wells Cost Estimation Methodology

- More than 80 Onshore and 30 Offshore Oil/Gas Fields were Considered
- NIOC Experts with more than 15 years of Experience in Drilling Industry were Participated
- More than 15 Years Drilling Data Collection
- Statistical Work on Collected Data



# Drilling Oil and Gas Wells Cost Estimation Methodology

## Onshore Drilling

No.	Description	Dev. Wells	Exp. Wells
1	<b>Material and Equipment</b> Tubular (Casing, Liner, Conductor, Tubing), Well Head, Xmass Tree, Completion Equipment	35-41%	25-30%
2	<b>Drilling Services</b> Drilling, Completion Fluid & Waste Management, Cementing & Pump, Bit & Mill, Directional & Survey	16-22%	25-29%
3	<b>Rig and Related Services</b> Rig & Related Services Drilling rig/ Daily rate, Moving, Positioning, ROV & Seabed survey	30-38%	40-44%
4	<b>Logistics</b> Logistics Transportation, Boat, Helicopter, Fuel & Water	4-6%	3-4%
5	<b>E &amp; M</b>	3-5%	0

Cost Drive

# Drilling Oil and Gas Wells Cost Estimation Methodology

## Offshore Drilling

No.	Description	Oil Dev. Wells	Oil Exp. Wells	Gas Dev. Wells	Gas Des. Wells
1	Material and Equipment	8-15%	15-17%	32-36%	20-23%
2	Drilling Services	21-34%	19-23%	29-31%	27-31%
3	Rig and Related Services	48-56%	50-54%	20-24%	30-34%
4	Logistics	8-12%	10-12%	10-12%	13-14%
5	E & M	0.8-1.2%	0	2-4%	3-4%

Cost Drive

# Drilling Oil and Gas Wells Cost Estimation Methodology

## Onshore and Offshore Drilling

- Rig & Related Services Cost = Rig daily rate \* Drilling duration (day) Based on Market

	Well Type	Drilling Duration (day)	
Onshore	Oil	Development	80-250
		Exploration	230-350
Offshore	Oil	Development	50-200
		Exploration	230-350
	Gas	Development	75-96
		Descriptive	130

# Drilling Oil and Gas Wells Cost Estimation Methodology

## Onshore Drilling

Drilling Costs for an Oil Development Well in NIOC

Drilling Duration	Rig Daily rate (USD)	Equipment & Material (USD) 35-41%	Drilling services (USD) 16-22%	Rig & related services (USD) 30-38%	Logistics ( USD ) 4-6%	Engineering & Management 3-5%	Total (USD)
		38%	19%	34%	5%	4%	100%
80	19,000	1,698,824	849,412	1,520,000	223,529	178,824	4,470,588
100	19,000	2,123,529	1,061,765	1,900,000	279,412	223,529	5,588,235
120	19,000	2,548,235	1,274,118	2,280,000	335,294	268,235	6,705,882
140	19,000	2,972,941	1,486,471	2,660,000	391,176	312,941	7,823,529
160	19,000	3,397,647	1,698,824	3,040,000	447,059	357,647	8,941,176
180	19,000	3,822,353	1,911,176	3,420,000	502,941	402,353	10,058,824
200	19,000	4,247,059	2,123,529	3,800,000	558,824	447,059	11,176,471
220	19,000	4,671,765	2,335,882	4,180,000	614,706	491,765	12,294,118
240	19,000	5,096,471	2,548,235	4,560,000	670,588	536,471	13,411,765
260	19,000	5,521,176	2,760,588	4,940,000	726,471	581,176	14,529,412



# Drilling Oil and Gas Wells Cost Estimation Methodology

## Offshore Drilling

Drilling Costs for a Gas Descriptive Well in NIOC

Number of Day	Daily rate ( USD / day)	Equipment & material ( USD ) 20-23%	Drilling services ( USD ) 27-31%	Rig & related services ( USD ) 30-34%	Logistics ( USD ) 13-14%	Engineering & Management ( USD ) 3-4 %	Total (USD)
		21.7 %	29 %	32.4 %	13.3%	3.6 %	100%
120	80,000	6,429,630	8,592,593	9,600,000	3,940,741	1,066,667	29,629,630
125	80,000	6,697,531	8,950,617	10,000,000	4,104,938	1,111,111	30,864,198
130	80,000	6,965,432	9,308,642	10,400,000	4,269,136	1,155,556	32,098,765
135	80,000	7,233,333	9,666,667	10,800,000	4,433,333	1,200,000	33,333,333
140	80,000	7,501,235	10,024,691	11,200,000	4,597,531	1,244,444	34,567,901

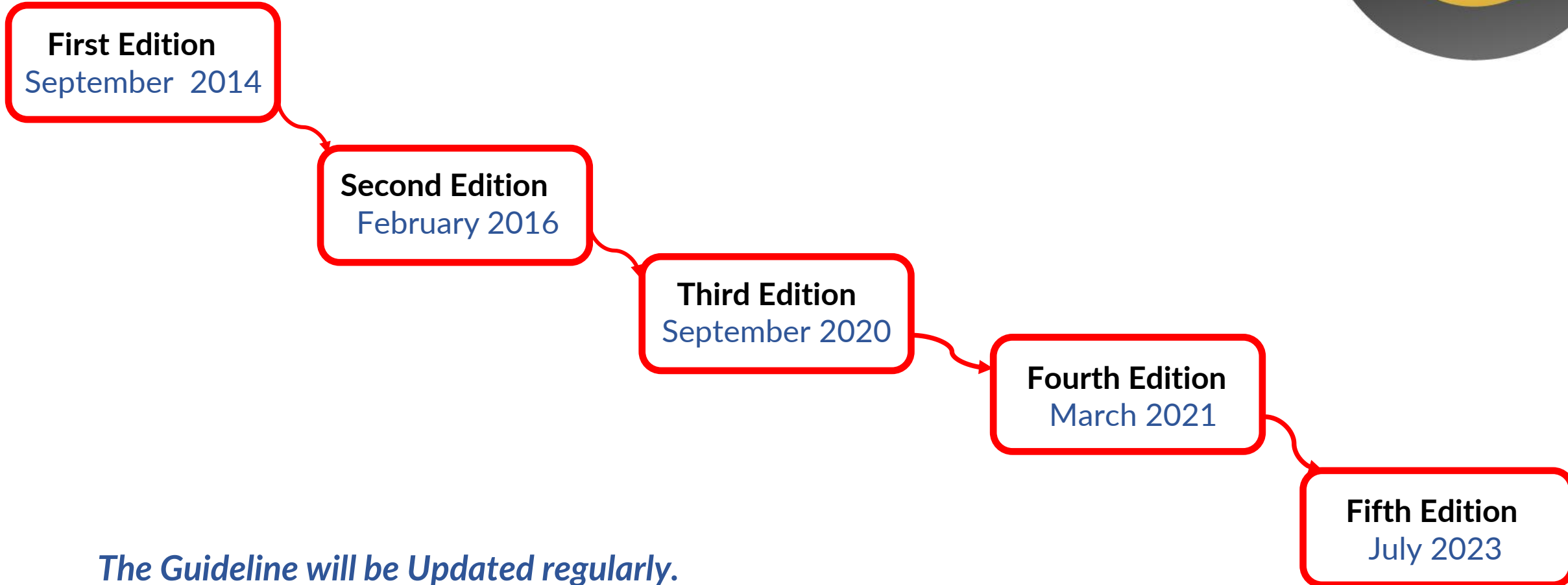
# Drilling Oil and Gas Wells Cost Estimation Methodology

## Onshore Drilling

### Examples of Modification factors for uncommon conditions

No.	Description	
1	Material for wells p>10 ksa	The material cost increases by 95%.
2	Rig with 2500 hp	The Rig daily rate increases by 10%.
3	H2S Services	The Rig and Related services cost increases by 3%.
4	Acidizing	The Drilling services cost increases by 3-4%.
5	Directional Drilling	The Drilling services cost increases by 20-30%.

# The Development History of the Guideline



*The Guideline will be Updated regularly.*



**THANK YOU**

Your Company Logo